TABLET INITIATIVE: GOALS, EXPERIENCES, AND OUTCOMES

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Submitted to the Graduate Faculty of the
College of Education
Texas Christian University
in partial fulfillment of the requirements
for the degree of

Doctor of Education

May 2015

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Has been approved by the College of Education

In partial fulfillment of the requirements For the degree of

Doctor of Educational Leadership

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ACKNOWLEDGEMENTS

During this endeavor, I was reminded I have much to be grateful for and many loved ones to appreciate. First, I want to thank my Lord and Savior Jesus for His love and grace. He has made me who I am and continues to mold me for which I am thankful.

I also want to thank my wonderful wife, Paige, who has supported me through graduate school for seven long years. I could not have done this without you. You are my best friend and you have done more for me than I could ever deserve. I love you very much!

I would like to offer a special thank you to Dr. Jimerson. You have had a limitless supply of patience through this process and always pushed me to be excellent.

There are a number of other friends and family who have supported me along the way as well. I thank you all for your help and words of encouragement.

TABLET INITIATIVE

Abstract

The incorporation of technology into schools has a profound impact on students, educators, and leaders. There are a number of variables to consider when undertaking a district implementation. This study was aimed at understanding the experiences of a tablet initiative with a focus on leadership, benefits, drawbacks, and teacher perception.

Leaders must contend with the guidance and vision of a technology change initiative along with school and district culture. Teachers have to adjust to a changing role, shifting from the source of information to a facilitator of learning. Students take on technology use in an educational context which can oppose the typical personal use of a mobile device.

This qualitative study looked at three schools in the same feeder system within a district. The goal was to understand the experiences within each of these campuses as well as across them. The experiences of staff, students, and leaders were shared through surveys, interviews, focus groups, and observations.

Leaders at each campus expressed a desire to see students gain access to technology and information as well as higher engagement. Data also revealed an inability to articulate change goals from a number of staff. Overall a lack of growth toward district goals was found due to issues of uneven access, misuse, and a lack of understanding of frequently used terms. Teachers perceived the implementation as the future of education and a way to move towards a digital classroom. They also viewed professional development as necessary for success but perceived students as already “savvy” with technology while teachers were lagging behind.

The study findings suggest a clear vision needs to be communicated by leaders along with a common understanding of frequently used vocabulary. As technology is incorporated into schools, uniform access to hardware is foundational. Rethinking teaching practices with technology should also occur with emphasis on pedagogy and content. Information literacy should be taught consistently and student use of technology should be monitored. Future research should continue to explore the role of leadership, vision, effectiveness, and perceptions.

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Chapter One: Introduction

The creation and use of technology has radically changed the world and the people in it while becoming a driving force in almost every part of society. What is it about technology that makes this possible? Why do individuals and organizations use technology? Why do some embrace technology with enthusiasm while others are quick to push back? According to Wayman and Cho (2012), "A typical belief about technologies is that they improve work. Faced with a task that is burdensome or time-consuming, we seek out tools that will make our efforts more productive" (p. 7). Technological based tools change the way people work, thereby creating the opportunity for life to be better.

What's the Problem?

Organizations in healthcare, business, and supply chain management illustrate this change by the way their processes evolve in response to technological innovation. In medicine, Avancha, Baxi, and Kotz (2012) describe the use of Mobile Internet Devices that can remotely monitor a patient through the use of sensors that feed information to doctors who can make adjustments. Patients also have the ability to track their own progress. In business, Elmore (2013) explains the use of computer tracking software that looks at the first item placed in a consumer's cart on Cyber Monday and can then generate additional offers based on that item to increase revenues. She also notes that businesses are starting to allow employees to BYOD, or bring their own device, to work, which enables the employee to take that device home or wherever else they might be and continue to work if necessary. Supply chain management (managing or organizing the flow of goods) has also changed through the use of radio frequency

identification (RFID), allowing firms to track items using radio waves. According to Liu and Chen (2009), "Applications of RFID technology can be found in many areas, including material management, inventory review, manufacturing automation, parking lot control, building entrance security, automobile burglar alarms, and the like" (p. 2203). The field of education has not been immune to this change, but has been slower about adopting work-altering technologies. Dickerson, Williams, and Browning (2009) further shed light on the need for technology changes in the classroom by adding, "As more professionals adopt tablet PCs for use in the workplace, there is a subsequent increased demand for tablet PC instruction in the classroom" (p. 16). Technology has already begun to effect some changes through use in educational settings. Distance education is now a viable method of delivering instruction (Yousuf, 2007) and the use of laptops are making writing easier by identifying and reducing errors as well as speeding up the editing process (Mouza, 2008). The advent of 3G technologies has reduced proximity to individuals as a required vehicle for conversation by giving them a device that acts as their communication nerve center; a mobile device keeps them reachable and potentially in contact for learning opportunities (Merchant, 2012).

Technology in Education: Necessity, Challenge, Benefit

The incorporation of technology into a classroom does not automatically result in excellent teaching (Peluso, 2012); consequently, technology use and teaching can easily be viewed as a false dichotomy. Marzano (2007) argues that the quality of the relationship educators establish with their students is the most foundational and determining factor of classroom learning regardless of how learning occurs. Using technology in the classroom does not preclude

teaching best practices, but can add to and enhance these practices depending on how educators employ various devices. Marzano (2007) emphasizes the importance of rules and procedures that should be put in place at the onset of the school year as a general teaching best practice, but also notes that amendments may be necessary especially when parts of the classroom evolve. Placing technology in the hands of students at any age will require rules and procedures for effective learning.

During the learning process, all students regardless of subject or setting should be "actively processing the content" (Marzano, 2007, p. 29). Zemelman, Daniels, and Hyde (2005) echo this sentiment stating, "Active, hands-on, concrete experience is the most powerful and natural form of learning. Students should be immersed in the most direct possible experience of the content of every subject" (p. 10). Certain technologies, such as mobile devices, allow students a platform to experience and manipulate content while teachers facilitate a conversation, giving their pupils time to process and answer using their experiences (Powell and Kalina, 2009). Mobile devices provide an avenue where multiple conversations can occur through text messages, (Pegrum, Grace, and Robert Faulkner, 2013). This kind of experience is geared towards real life, it is meaningful, and creates a place for learners to wrestle with content (Dennick, 2012).

As educators challenge their students and push them to discover new content, times of reflection also become necessary (Dennick, 2012). One of the opportunities students have to self-reflect is through a log book or journal which can be created digitally and would allow the writer to track their thought process in order to compare initial findings with new discoveries (Dennick, 2012). Students also have an opportunity to receive feedback from teachers via a digital medium

such as email, messaging, chats, message boards, or video. During the entire process, educators must inspire interest (Marzano, 2007) and capture the learners' attention in order to engage them (Powell and Kalina, 2009). Interactive technologies provide a means to accomplish these goals, but regardless of how many devices are in use or how many programs a school has available, the most important piece of the puzzle is how device use reinforces learning (Pegrum et al., 2013).

Teaching is a challenging profession that comes with obstacles to navigate. Effective teaching can be difficult: Cooper and He (2012) state, "It is a complex process for teacher candidates to become effective classroom teachers" (p. 89). The application of technology into the classroom and school system should make things better or at least easier in some ways. Technology is taking something manmade and applying it in a way that makes the human experience easier. Pegrum et al. (2013) observed mobile device use leading to flexible classroom formats that removed the fixed desk concept in an attempt to foster collaboration. This collaborative atmosphere is in line with best practices that attempt to create effective times of inquiry and discussion among learners (Powell and Kalina, 2009). Technology is not a cure all or silver bullet: Lim, Zhao, Tondeur, Chai, and Tsai (2013) note "The effectiveness and use of these technologies depend on the people, processes, culture and structure of the context in which they are situated" (p. 60).

Encouraging Technology in Education

Implementing mobile devices has challenges, but there are also factors that help facilitate their implementation into educational classrooms. Merchant (2012) describes mobile devices as playing a key role in the social interactions of individuals because they act as a communication

hub for contacts and messages. If Marzano (2007) is correct about teaching and learning being centered around relationships and connections, then mobile devices could be a way to capitalize on the way students are already connecting.

Pegrum et al. (2013) notes the opportunity for mobile devices to increase the freedom of when and where to learn. Students can use their devices in the classroom, hallways, cafeteria, etc. and if teachers have recorded lessons students can view them or other online videos from anywhere they have an internet connection (Traxler, 2010).

Rossing, Miller, Cecil, and Stamper (2012) describe the increased freedom as a means of greater collaborative opportunity. Students can work in flexible groups that can change size or location without losing much efficiency. Rossing et al. (2012) also see mobile devices as a way for students to have significant access to vast amounts of information. Information location is accomplished quickly through the use of search engines and key words. The growing variety of tools and functionality across mobile devices makes them a platform that has to at least be considered for educational use.

Potential Benefits of Technology

The implementation of any new technology has repercussions to contemplate. For instance, a piece of technology can put one or more individuals out of a job, consolidate the roles of older technologies leaving hardware that needs to be disposed, or generate a need for new programs to enable one system to communicate with another. Therefore, the decision incorporate technology should come with careful consideration of possible consequences. Despite these challenges, there are potential educational benefits for schools who invest and use technology. Potential benefits depend on the specific hardware, features, and optimal use.

Engagement. Student engagement is a potential benefit of the incorporation of technology into education. Marzano (2007) describes engagement as "activities teachers can use to capture students' attention in a way that enhances their knowledge of academic content" (p. 98). Educators can use technology to help the user become a part of the lesson and immerse him or herself in a video, presentation, question and answer poll, or even an interactive journal. Using technology as a tool for content delivery and engagement turns the student from a passive onlooker to an active, integral participant.

Turning students into participants works well with mobile devices because students want to interact with technology. Collins and Doll (2012) characterize today's students as individuals who "do not just use technology, but they interact with it and create content" (p. 6). Satisfaction is obtained by becoming a part of the process of using technology rather than just taking in information. Students can look for their own information and share it along with their thoughts and questions leading to a self perpetuating cycle of engaged, inquiry based learning.

Customizable content. Technology enables educators the opportunity to customize the classroom, their content, and even delivery of instruction in an efficient way. Differentiation is an expectation in the classroom with students who have different reading levels, backgrounds, and various learning styles. Salpeter (2009) believes that, "Differentiation of instruction demands that we turn away from the static printed page and adopt a more hyperlinked, multimedia and interactive approach to the delivery of content" (p. 29). Mobile devices provide an avenue for taking a lesson or assignment and adapting it to different levels to meet students at their current levels of performance or interest. Assignments may be quickly altered or reformatted and

distributed to the class from anywhere provided there is an internet connection. Students are able to complete an assignment through a variety of methods; there is a choice to use voice recognition software for dictation, generate a presentation, or even make and edit a video (Rossing et al., 2012). Technology allows the user to create and therefore share in a way that is not a one-size-fits-all worksheet type approach to assessment. Customizability also works well for students with individualized education plans because they can have accommodations and modifications built into the assignment and content delivery.

Simmons and Carpenter (2010) describe how a student with a mild intellectual disability could utilize a mobile computing device, like a tablet, in order to develop their spelling and writing abilities:

> Portable word processors offer an alternative to the stationary computer. These devices are lightweight and easy to transport from classroom to classroom. Many of these mobile computers have text-to-speech features, word prediction, spell checker, and connectivity to other technologies. In addition to features that assist with spelling, the student would have access to additional tools that support successful writing. (p. 12)

If teachers are attempting to meet the needs of each student on an individual basis, a tool that grants the opportunity to distribute selectively, create assignments in a variety of ways, and interact with students in more than one medium may be attractive given the right context.

Facilitating the learning experience. Mobile computing allows users to have a unique learning experience based on where they are and where they would like to go. Clark and Luckin (2013) describe all learners as being “different” and requiring “teaching and learning interactions that acknowledge these differences and provide suitable support” (p. 11). The need for a unique

interaction with each individual student changes the fundamental function of a teacher, taking them from a dispenser of content knowledge to a facilitator of inquiry (Dexter, Anderson, & Becker, 1999). Teachers can now use technology as a tool to facilitate the growth of each individual at an independent level and challenge each one of them accordingly. This is a task that was not as practical before advances in mobile computing due to the large amount of resources it would require whereas now many of those resources are being consolidated into one space. For example, multiple desktop stations can take up a large section of a classroom and require extra time to move whereas mobile devices can be stored in a cabinet the size of a single desk and be quickly distributed for use.

Challenges. The implementation of tablets into the educational setting comes with its own host of challenges and potential obstacles. Ertmer and Ottenbreit-Leftwich (2010) describe learning about technology for a teacher as the "equivalent to asking teachers to hit a moving target" (p. 260). Educators will never have a finalized understanding of technology because it is always adapting and transforming. Mobile devices are small and can be transported anywhere whether they are authorized to be there or not (Pegrum, Oakley, & Faulkner, 2013) and at times users choose to engage in practices that are against rules, unethical, or unlawful (Adiguzel, Capraro, & Willson, 2011). Buildings may need retrofitting or remodeling based on technological specifications for networks and conditions are consistently different across campuses leading to personalized solutions for each one (Hayes, 2006). Inevitably new programs, facilities, or materials put into place in a school district are going to see the creation or addition of new rules that were not previously in place because there was no need (Marzano, 2007).

Education does not have to be done in the extremes of either all technology or none at all or all inquiry based and no direct instruction. Robertson (2007) says, “Science teachers can do both: They can practice inquiry science and ensure that students grasp content knowledge” (p. 67). Students can be given information as well as the opportunity to explore. Ownership becomes a part of the educational process as students gain a deeper level of meaning and understanding while exploring topics and developing skills.

The Evolution of Technology in Schools

In the past, pens, paper, etc. were “technology.” Then came calculators which were followed by desktop computers. Most recently interactive devices such as whiteboards and clicker systems have been introduced into the classroom and today we have arrived at individualized tablet technologies.

Tablet Initiatives on the Rise

Tablets are one of the newest technologies to enter schools and have gained popularity since their inception, which has only benefited from the competition among technology companies (Clark & Luckin, 2013). The popularity of tablets is largely due to their ever growing list of capabilities; tablets are thin, light weight, portable, easy to use, and fast. Tablets combine the needs and wants of individuals into one convenient place, allowing multiple tools to be replaced by just device. Included in many tablets are a camera, calendar, map, music storage and playback.

Tactile and engaging. Aside from the ability to function as a multitool, many students reported their experience with an iPad as fun (Rossing et al., 2012). Tablets do not require a stylus to interact with the screen but users can interface with the swipe of a digit, allowing

students to engage tactilely with the technology. Clark and Luckin (2013) state that, "The finger-driven iPad interface can motivate and engage students, keeping them interested in content for longer, and allowing groups to interact with the device at the same time and with the same object" (p. 2). Navigation through the fingertips makes the experience memorable by incorporating the sense of touch. Users can swipe in multiple directions which have different meanings depending on the number of digits and the direction of the swipe. Two digits can be used to pinch the screen making content smaller or stretch to magnify content. Double tapping can automatically adjust the content on a website to the appropriate size of the screen for the convenience of the reader.

Tablets also allow users the opportunity to multitask by easily navigating between one screen to another without closing their work. For example, music can also be played in the background while on a project which could benefit students: Taylor and Rowe (2012) found that playing Mozart positively impacted student results on a college trigonometry exam.

"**The blind man's cane.**" The personal nature of tablets is another aspect that adds to their allure. Traxler (2010) describes the difference in moving from desktops to mobile devices, "Interacting with mobile technologies is different and is woven into all the times and places of students' lives" (p. 151). Merchant (2012) illustrates this by similarly stating, "we may see that mobile use is approaching the state, famously described by Heidegger as 'the blind man's cane,' in which a material object becomes the extension of the human being" (p. 779). Tablets connect users with their friends through emails, messaging, and social media. Magazines and news feeds also allow for up to date feeds of what is going on around the nation and world. Through

continued and consistent usage tablets become an interconnected part of the day (Lim et al., 2013). Educators can tap into this same notion by using tablets to make education personal if tablets are used as an essential piece of the learning and creating process.

Relevant. As the culture around it changes, school districts are searching for ways to stay relevant and reach students in new and meaningful ways (Peluso, 2012). A new generation of children are growing up with more and more media to consume. According to Roberts and Foehr (2008), "The average American eight to eighteen year-old reported more than six hours of daily media use" (p. 11). It appears as though technology represents a promising avenue to reach students. At the same time, the introduction of technology does not automatically lead to engaged learners. Peluso (2012) cautions readers that teenagers are not automatically proficient with mobile devices, "While it may seem that all young people are highly capable of using iPads and digital media to learn and express themselves, it is not universal, nor something to be ignored when considering the incorporation of these technologies into the classroom" (p. 126). Tablets are a tool that can help schools maintain relevance but their mere presence does not instantly equal relevance.

Purpose of the Study

Technology of various shapes and sizes is all around and there is no getting away from it. Today's students are growing up in a world of technology infused living; they expect technology and they want technology. Mobile technologies seem to fit the bill for meeting the goals of individualizing education and engaging students. Tablets have emerged as a go-to technology for districts looking to meet these goals.

School districts are searching for ways to improve the educational experience, better prepare students to be successful citizens, and encourage life-long learning (Collins & Halverson, 2009). This search means new initiatives and many of these initiatives will revolve around one particular technology: interactive tablets. Tablets have entered the classroom in backpacks and pockets of students for the past several years but they have just recently been utilized in the learning process (Peluso, 2012). The implementation of tablet initiatives carry ramifications for budgeting, instruction, and learning. Careful consideration of the strategy and approach for putting a tablet program into place may make the difference between success and failure, therefore it is important to gain a clear understanding of what the goals of such a program are and to examine whether or not they are met. The purpose of this study is to explore the implementation of a tablet initiative as it unfolded in one school district and to examine the degree to which actualized use of the technology approximated stated goals. Accordingly, the study will be guided by the following questions:

1. What changes did leaders hope to catalyze through the use of tablets?
2. To what extent were stated goals for the initiative realized in practice, and what factors facilitated or hindered the realization of these goals?
3. How did teachers perceive the implementation of tablets?

Chapter Two: Review of the Literature

Tablets and other mobile technologies are being developed and introduced into school districts, making it necessary for decision makers to understand the landscape of these technologies. The potential impact tablets could have for stakeholders requires leaders to make an informed decision as to what to use, when to introduce it, and the details involved with how to make it happen. The major stakeholders whom a tablet implementation will directly impact are students, teachers, and school leaders. There is value in learning about how students, teachers, and school leaders are impacted by technology as well as how they currently view and use technology right now. Another need is to evaluate the current state of tablets and similar devices to develop understanding of their present uses, costs, benefits, and pitfalls. In this review of the literature, I begin by exploring some of the prominent teaching practices for the last half century and opportunities for technology to support those practices. From there I move into an examination of the impact and considerations for students, teachers, and leaders and finish by discussing facilitators and challenges of technology implementation.

Best Practice and Technology Fit

The education system has always been in the throes of change with new ideas popping up as well as old ideas packaged in new ways. From the days of the apprentice model to the advent of the printing press, from the one room schoolhouse to the modern schools seen today, technology and education have always been bound together in some form albeit simple or complex (Collins & Halverson, 2009). One of the keys to education is the notion of incorporating best practices into teaching. Zemelman et al. (2005) describe the term best practice as “serious, thoughtful, informed, responsible, state-of-the-art teaching” (p. vi). It is important to

note that over the years not all best practices are equal; some come and go while others stand the test of time as consistently good teaching practice. Johnson (1965) describes the ongoing challenge, "Not only is the teaching process complex because of the many pressures influencing it but because no one theory has yet been found that satisfactorily explains the learning process" (p. 33). Best practices are foundational and must not be lost during any change be it technological or otherwise.

Addressing Best Practice

Best practice is a slippery term meaning different things to different people. For the purposes of this literature review, best practice will be used in a two-fold manner; one view of best practice examines technology intersecting pedagogy and the other is best practice for addressing a tablet implementation.

Intersection of pedagogy and technology. Today's teachers have to weave together a number of different knowledge bases in order to perform their jobs effectively (Koehler, Mishra, & Cain, 2013). They have to understand "content (the actual subject matter that is to be learned and taught), pedagogy (the process and practice or methods of teaching and learning), and technology (both commonplace, like chalkboards, and advanced, such as digital computers)" (Mishra & Koehler, 2006, p. 1025). An understanding of the TPACK framework (Technology, Pedagogy, and Content Knowledge) requires teachers to examine each of these three components together to determine how their relationships to one another can be applied in the classroom in a specific educational context (Mishra & Koehler, 2006). Pedagogy and content have been around for a long time, as has a number of ways to package them. Some of the

teaching best practices over the last fifty years will be touched on before moving into ways they might potentially intersect with technology.

1960s. During the sixties, instructional methodologies included a step-by-step approach, discovery learning, and some team teaching (Johnson, 1965; Meyer, 1969). The step by step method, or individual guidance, of the teacher telling the student what to do was much more prescriptive in its approach and centered around the educator looking for weaknesses in students that could be strengthened (Bartz & Miller, 1991; Johnson, 1965). This method was seen as somewhat flawed especially when it came to problem solving because Johnson (1965) found that "students who were taught to follow a particular method or procedure were actually taught not to think; they used the same procedure when given a different type of problem" (p. 41). The same could be said of putting technology in the hand of a student to solve a problem without understanding what is actually happening.

The discovery method involved guided discovery where teachers put instructional materials in front of students and based on their responses would then decide the next appropriate set of instructional material for the student until the desired goal was reached (Johnson, 1965). Team teaching (two or more teachers pooling their resources and knowledge to cooperatively teach a group of students) was introduced as a way to capitalize on the strengths of teachers by giving them opportunities to teach a specialty (Meyer, 1969). This was seen as a possible alternative for moving away from mass schooling with little or no strategy behind it (Meyer, 1969).

1970s. The 1970s were characterized by a continuation of the discovery method with the notion that, according to Peters (1970), "when the subject is allowed to discover the rule or

principle for himself, greater and more enduring learning will take place, and the learning will be more readily transferred to new situations" (p. 84). Peters (1970) did not find this to consistently yield positive results but became more effective when complemented with some form of direct instruction.

Another teaching approach popular in the 1970s was "wholes and parts" with the idea being that teachers can give their students a number of small parts that can then be assembled into the whole picture (Conklin, 1973). The teacher plays a key role in determining how to break the parts up and which ones are appropriate to give to pupils at certain times while the student must not only put the parts together but make meaning of what is shown once things start coming together (Conklin, 1973). This method swings away from rote memorization and focuses on the ability of the student to make meaning out of the whole they are constructing.

1980s. The 1980s included practices such as the use of discussion based learning and whole group instruction, as well as matching learning and teaching styles. Gall and Gillett (1980) promoted discussion based learning as an opportunity to develop problem solving skills and promoted mastery of content by utilizing spoken communication, nonverbal cues, and listening skills all in one process. This method of instruction was perceived as having the added benefit of encouraging flexibility on the part of the instructor to respond according to the direction of the discussion as well as learn from his or her students (Gall & Gillett, 1980).

Whole group instruction saw a resurgence because of the opportunity to increase time on task (Bartz & Miller, 1991). This type of instruction made use of limited time and gave educators a way to be interactive with everybody at once.

The 1980s also saw a push for educators to determine the learning styles of students and then match those with an appropriate teaching style (Bartz & Miller, 1991; Henson & Borthwick, 1984). One of the driving forces behind this method is to create a form of instruction that is personal for each student (Henson & Borthwick, 1984). This style of instruction also promotes student involvement by engaging students in a style that they prefer as well as eliminating some behavioral issues by matching overactive pupils with a style related to behavior (Henson & Borthwick, 1984).

Another practice during this decade was focused around a lesson design developed by Madeline Hunter called Instructional Theory Into Practice (ITIP). The model involved the following parts: a statement of the purpose and objective for the lesson, an anticipatory set used to link prior knowledge to the lesson, instruction delivered in the form of modeling or demonstration, checks for understanding with lesson adjustment followed by guided practice, and ending with independent practice (Stallings & Krasavage, 1986).

Mastery learning was also being used in schools during the later part of the 1980s. Material was delivered to students in units with the goal of passing (90%) a formative assessment to demonstrate mastery (Whiting & Render, 1987). Objectives were taught based on the unit, assessment questions came from the objectives, and if a student failed to demonstrate mastery, he/she could re-take the exam without penalty until reaching mastery (Whiting & Render, 1987).

1990s. Best practice in the 1990s involved a variety of advocated methodologies. Adaptive instruction was encouraged based on the ability of teachers to identify strengths and areas of weakness in students (Bartz & Miller, 1991). Teachers were encouraged to develop

specific goals for students and match learning styles with instructional techniques (Stewart, 1997).

Direct instruction was found to show positive results for teaching basic skills especially in a sequential manner (Bartz & Miller, 1991). Teaching by objective is commonly paired with direct instruction. Bartz and Miller (1991) state, "This method is based on the logic of making clear to the student, as well as the teacher, the exact skills to be learned" (p. 11). A clear expectation is then set for both learner and educator.

Stewart (1997) discussed efficiency in management of resources as a critical skill for teachers. The way the classroom is arranged goes a long way towards achieving this goal and giving teachers more time for instruction (Stewart, 1997). Efficiency in management also pairs with the importance of flexibility in learning. Teachers were encouraged to take on a facilitating and coaching role and give more responsibility to learners for motivation and initiative (Niklova, 1998). Instructors can make the most of their time while circulating from pupil to pupil or group to group and still guide instruction based on needs.

2000s and today. Some of the more current best practices include a look back at teaching for mastery. According to Guskey (2007), "Teachers who use mastery learning provide students with frequent and specific feedback on their learning progress through regular, formative classroom assessments" (p. 15). Guskey (2007) explains the importance of pairing corrective actions with each set of feedback in order to make a change and on top of that, the corrective activities must be different from the original teaching which serves the dual purpose of giving the student a new way to learn the material and the teacher has a form of differentiation. Those who

need more help can get it and those who understand the material can extend deeper into the content.

Differentiation was a major emphasis in the early 2000s. Tomlinson (2000) described differentiation as a belief in the way thinking and learning is viewed. Students who are the same age have a different level of readiness for learning based on their experiences, interest, and circumstances and these differences are large enough to to impact what they learn, the pace they learn it, and the support they need (Tomlinson, 2000). Standards based curriculum can have differentiation according to Tomlinson (2000) who states, "you can challenge all learners by providing materials and tasks on the standard at varied levels of difficulty with varying degrees of scaffolding, through multiple instructional groups, and with time variations" (p. 9).

Relational learning is another form of best practice seen during this period where students are engaged by teachers who help to motivate them (Johnson, 2008). Johnson (2008) describes the importance of engaging students in interactive formats where pupils are forced to be active instead giving them the chance to consume in a passive format. Johnson (2008) summarizes her work by saying, "Schools should consider providing a variety of instructional methods with particular attention to higher proportions of collaborative learning experiences for adolescent students" (p. 83).

Konrad, Helf, and Joseph (2011) advise educators to maximize their teaching efficiency in the classroom in an effort to help close the achievement gap many students are facing. "Simply stated, instructional efficiency is teaching and managing a classroom in a way that yields desired outcomes while using no more time, effort, or resources than necessary" (Konrad, Helf, &

Joseph, 2011, p. 68). The main thrust of this practice is to evaluate what is needed to accomplish an instructional goal and if there is more than one method yielding the same result then the method that takes fewer resources should be selected. Konrad, Helf, and Joseph (2011) describe another way to maximize efficiency by arranging desks intentionally so that there is a purpose behind traffic flow, ease of access to materials, and flexible grouping opportunities.

McFarlane (2011) believes the work of Dr. Howard Gardner and multiple intelligences is the key to teaching in a globally connected world. McFarlane (2011) argues that some of these intelligences come from culture while others are innate and that teachers already instruct using multiple intelligences. This practice is another way of customizing instruction to meet the needs of individual students.

Tablet implementation best practice. Another level of best practice is understanding strategies for successful tablet implementation. Vega (2013) summarizes Edutopia's three keys to successful technology implementation as students playing an active role in the learning process with feedback, critically analyzing and creating, and applying classroom activities to the real world. McLeod and Richardson (2013) support administration and leadership as the first place to go when looking for solutions to technology implementation. They are in a unique position to help facilitate a shared vision, develop the culture, and distribute leadership functions (McLeod & Richardson, 2013). Haan (2012) advocates for a well thought out plan and gives the example of a middle school who used a phase-in strategy for tablets. The idea was starting first with good academic and social habits followed by bringing parents onboard before exposing students to a need for technology. Once the need was established, guided technology use took place and then students were able to demonstrate technology trust until they were able to use their devices

anytime; the entire process took about two and half months. This phase-in strategy lines up with Bergmann & Sams' (2014) ideas about the flipped classroom being about teachers shifting away from the center of the classroom and spending more time trying to engage students.

Best Practice and Emerging Technologies

Best practices have been and will continue to be emphasized. It is critical during the implementation of technology that best practices not be lost, but rather that the technology supports already good instruction. Ertmer and Ottenbreit-Leftwich (2010) summarize the importance of best practice by saying, "To use technology to support meaningful student learning, teachers need additional knowledge of the content they are required to teach, the pedagogical methods that facilitate student learning, and the specific ways in which technology can support those methods" (p. 260).

Discovery. One of the ways mobile devices can potentially be an avenue for meaningful learning is through discovery. Rossing et al. (2012) describes technology use changing the way course knowledge is obtained by allowing students to pick and choose chunks of knowledge when they need it. This feeds into the notion of discovery because students do not necessarily know what they will be learning until they begin searching based on a need that arises. A similar idea is seen in the use of gaming and interactive simulations. A simulated environment is a place where users can search and discover a number of situations and problems to solve (Echeverri & Sadler, 2011). Students will have to determine a solution on the spot which could lead to further research and discovery. This problem solving on the spot dovetails with Collins and Halversons' (2009) view on just in time learning. Instead of equipping a student with everything

they could possibly ever encounter, Collins and Halverson (2009) advocate teaching students how to locate information with internet search engines.

Creation. Mobile devices can also potentially enhance best practice by giving users a new medium with which to create. Seaman (2011) references creation and synthesis of original material as higher order concepts which could make a piece of technology capable of being used as a tool of creation valuable. Merchant (2012) lists some of the ways mobile devices are used for novel design by focusing on the multimedia functionalities such as the ability to take photos and record videos. Not only can students use multimedia to create, Traxler (2010) notes that students are able to publish information about themselves opening the door for reflection based on either experiences interacting with others or from looking within Dennick (2012).

Differentiation. Technology use also customizes the learning experience when utilized correctly (Fuegan, 2012). Students find that mobile devices such as tablets allow them to select and engage in using a specific tool to fit their need (Clark & Luckin, 2013; Rossing et al., 2012). The differentiation or personalization can be taken a step further by downloading applications specific to a skill set or assessments and activities can be preloaded or sent to individuals who need the extra practice based on objective (Clark & Luckin, 2013). Hutchison, Beschorner, and Schmidt-Crawford (2012) studied a fourth grade class using iPad's for teaching literacy and observed the teacher using the tablets to assist in reading assessment in a variety of ways. The teacher gave students access to a selection of leveled books for independent reading, the dictionary function was used to assess student understanding of vocabulary, and a drawing/stamp app was used to illustrate the sequencing of a piece of literature (Hutchison et al., 2012).

Flexibility. Mobile devices are a viable means of increasing flexibility within the educational context. According to Yousuf (2007), "Mobile technology offers access to learning material regardless of location and time" (p. 117). Merchant (2012) echoes this sentiment when explaining that technology is on the go and can be with an individual anywhere they want. This further increases the flexibility in learning by giving users the opportunity to be in different parts of the school, city, state, and beyond. Flexible grouping is easily accomplished within a classroom or across a broader setting. Aside from the physical flexibility, mobile devices can also give flexibility in the timing of content. Learning can be accomplished in chunks (Traxler, 2010) and is self selected based on need allowing for a just in time approach to knowledge transfer (Collins & Halverson, 2009).

Efficiency. If good content and teaching alone are not enough to help close the achievement gap and resources spent must also be considered (Konrad et al., 2011) then technology is a feasible way to manage these resources. One example of efficient resource teaching could include recording lessons using a multimedia format (Yousuf, 2007) allowing students who were absent or students who need to hear something again the access to content while still freeing up the teacher for troubleshooting with other students. Rossing et al. (2012) notes the importance of the syncing feature for wireless devices; this allows content to be centralized and then pushed to devices for use. Mouza (2008) observed students with mobile devices collaborating through ad hoc peer tutoring and sharing of information with respect to functionality of devices as well as content. Each of these examples illustrates a chance for technology to bear a logistical burden that a teacher would commonly perform thereby freeing them up for an alternative use of time.

Technology Impact and Considerations

Any educational organization should consider the impact a technology implementation would have on their organization. Student, teacher, and leader perspectives have some similarities but also vary based on their usage, roles, and responsibilities. There are key concerns from each of these stakeholders to investigate.

Students

Zemelman, Daniels, and Hyde (2005) argue that schooling should be student centric, real, and build on the natural curiosity that is already there. If everything done in education revolves around students then the impact technology has on them should be considered first.

Digital divide. Using the term students to denote one singularly homogenous group of individuals would not be entirely accurate when referring to technology use because of the digital divide. Roberts and Foehr (2008) define the digital divide as, "varying access to certain media, particularly computers and allied technologies, related to differences in socioeconomic status, race and ethnicity, and gender" (p. 15). Individuals from lower income homes tend to have less access to technology and the internet than their middle and upper class counterparts (Modarres, 2011; Mouza, 2008; Valdez & Duran, 2007). This makes digital use in the classroom as well as take home assignments difficult because of the variety of technological availability.

Ritzhaupt, Feng, Dawson, and Barron (2013) remind readers that the term digital divide is somewhat subjective and can mean different things to different people. The trend has developed from a binary notion that the "haves" get access and the "have nots" don't to a continuum of ownership and access (Valadez & Duran, 2007). According to Ritzhaunt et al.

(2013), “The term digital divide has recently expanded beyond physical access to technology to include whether individuals have the necessary ICT skills” (p. 293).

Modarres (2011) discusses cell phones as useful technology but not the same as a laptop or desktop computer in terms of data input and sophisticated programming. Modarres (2011) speculates that the digital divide has morphed into a divide based on the type of access. Increasing cell phone use and availability for low income populations has not necessarily closed the gap but created a differential level of usage where low income populations use mobile phones to access content while middle and upper income populations create, generate, and synthesize using phones (Modarres, 2011).

Use outside the classroom. Mobile device use by students outside of the classroom is occurring in a variety of ways and for multiple purposes. Students use these devices as a way to communicate with one another (Lim et al., 2013; Peluso 2012). For example, this communication is being achieved by means of SMS messaging (Merchant, 2012) or social media (Peluso, 2012). Digital media are one of the ways students are choosing to “speak” with one another.

Sharing is another way mobile devices are being used consistently outside of the classroom (Lim et al., 2013). Photo albums and movie clips (Merchant, 2012) either self-generated or from another source are being sent from one device to another where they are edited (Collins & Doll, 2012), consumed, manipulated, or shared again (Lim et al., 2013).

Communication and sharing are not necessarily independent events because their hand-in-hand use contributes to an expression of self. Users are spending time on their devices by expressing themselves (Lim et al., 2013; Peluso, 2012; Traxler, 2010) to large and small

audiences. Merchant (2012) describes the world of mobile device use as one where half conversations transpire as individuals are using their devices in and out of interactions that occur simultaneously in one place and in others all at once. Users are multitasking by listening to music, sharing media, and messaging one or more people.

The world of mobile device use combines elements of the physical, geographical and digital environments. Each of these elements are melded together making it difficult to draw any distinction from one to another. Users are working and participating leisurely in a digital world (Lim et al. 2013; Traxler, 2010) and their activities do not all occur in perfectly partitioned segments. Employing technology in such an integrated manner gives users the opportunity to flow in and out of one activity or life compartment and right into another in a fluid way.

This idea of fluidity attributes to the way that mobile device users view their device as a part of themselves (Merchant, 2012). Mobile technology allows participants to access personal information quickly and in an instant be right back into another stream of data. The generation that has grown up with technology see it not as an inconsequential tool but rather as woven into their daily life (Considine, 2009; Lim, et al., 2013; Peluso, 2012; Traxler, 2010). A mobile device viewed as interwoven into daily life is not something easily removed and when used daily can becomes quite comfortable and depended upon.

Users are not seeing distinct boundaries between personal and professional use (Lim et al. 2013; Traxler, 2010) because work is not occurring in a bubble that is restricted to a time or place. According to Collins & Halverson (2009), “teens are leading the way in using new digital media to blur the boundaries between personal communication, work, and learning” (p. 13).

These blurred boundaries add to the embedding of device usage in everyday life because activities are completed in chunks instead of all at once.

One of the powerful effects of consistent mobile technology use by the current generation of students is the notion that rather than simply using technology, they are interfacing with it which leads to something novel. Collins & Doll (2012) state, "Millennials do not just use technology, but they interact with it and create content" (p. 6). Devices and technology are a means of creation for students who want to get their point across in their own way. The interaction is happening because using the devices is not inconvenient but rather an efficient way for students to create. Traxler (2010) describes mobile devices as "pervasive and ubiquitous, both conspicuous and unobtrusive" (p. 149); they are everywhere and stand out yet they are convenient and easy to miss because they are commonplace in campuses, coffee shops, parks, and many other public places.

A mobile device is a way for a user to have many of his or her own personal conveniences on the go and yet be in their own little bubble. They can connect with family (Lim et al., 2013), enjoy their music, arrange meetings, and check the web for desired information (Merchant, 2012) any time they want. There is an interesting dynamic between a mobile device and its user because it is an outlet for the "owners values, affiliations, identity and individuality through their choice and their use" (Traxler, 2010, p. 149).

Use inside the classroom. Currently mobile devices are being used in an assortment of ways in order to enhance student learning. One of the ways students are taking advantage of mobile technology is through the use of podcasting (Brand & Kinash, 2010; Britten & Clausen,

2009; Rossing et al., 2012). Students are watching and listening to lectures outside of the normal class time so they can ask specific questions when they do see the instructor or they can go over problems because there is already a baseline of knowledge established from the digital lecture. A teacher prerecords a podcast so students can stop or rewind to focus on specific segments or even listen to the lecture more than once.

Educational applications are being used (Murray & Olcese, 2011; Rossing et al., 2012) to enhance the learning process. Murray and Olcese (2011) describe the use of applications such as a "digital flashcard" (p. 46), which allows students to learn content and use a device that replaces additional space consuming supplies such as counters, base ten blocks, geoboards, hundreds charts, or readers.

Tasks previously accomplished with pencil and paper are now being completed in a digital medium. Students and teachers are creating presentations and notes digitally (Mouza, 2008) or recording and photographing (Merchant, 2012) for later analysis and breakdown. Time previously spent copying from the board is now available for redirection towards other learning activities. Students are also using digital media to create multimedia presentations (Rossing et al., 2012; Storz & Hoffman, 2013) as another outlet for creation with their devices.

Collaborative efforts are a growing trend in the usage of mobile technologies in schools as well (Bebell & Kay, 2010). Tablet users are able to share and interact with the same screen for more than one individual (Hutchison et al., 2012) while some students are using digital message boards (Skylar, 2009) in order to share findings and ask questions regarding a designated topic. Still others are using social networking (Rossing et al., 2012) such as twitter (Brand & Kinash, 2010) in order to work together and share their thoughts.

Student engagement. A visible theme among tablet and other mobile device users is that students are not automatically engaged just by having technology to use. iPads and similar devices are hailed as a new paradigm in innovative teaching and will captivate students by many of the media (Peluso, 2012).

Rossing et al. (2012) found:

> Although the novelty of the iPads initially appeared to be an opportunity for enhancing student excitement and engagement, this feature quickly became a limitation without clear activity design. In classes where students used the iPads without a clear purpose, the devices became more distracting than "fun". (p. 17)

Students do not want to merely use tablets; they need a teacher to tie these devices directly into the curriculum (Crichton et al., 2012). Integrating technology into the classroom calls for active engagement of students in the ways they work with technology outside of the classroom (Britten & Clausen, 2009).

Multiple studies do show that students are experiencing increased engagement with use of tablets and mobile devices but only when teachers help to tie their use to learning experiences. In classrooms where teachers are directly tying mobile device use to the curriculum (Bebell & Kay, 2010) and creating well designed activities (Mouza, 2008) students are reporting to engage at deeper levels and go beyond to gain a better understanding of their topics. For students who use iPads, schools must have a clear purpose and activity design (Rossing et al., 2012) in order to make their use meaningful instead of distracting.

Dickerson et al. (2009) give the following example of how to create clear purpose:

> It is critical to engage students in a discussion before giving hands-on opportunities. This prompts students to search for answers to their questions when they begin working with the technology. Based on this discussion, students will develop personal beliefs and ideas about the technology. These beliefs and ideas will trigger internal motivation during the hands-on activities as they attempt to find evidence that confirms or rejects their beliefs, notions, and ideas. (p. 17)

Game play. One way to capture the attention of students and engage them is through the use of video games that are adapted for educational purposes or created specifically to develop skill sets for a particular course. Incorporating play into the classroom with video games has resulted in positive attitudes from students towards learning (Mifsud, Vella, & Camilleri, 2013; Shin, Sutherland, Norris, & Soloway, 2012).

Video games provide a simulated environment (Witherspoon & Manning, 2012) for students to navigate through and learn from that, according to Echeverri & Sadler (2011), "affords a range of resources and opportunities for participation to which students might not otherwise have access" (p. 46). Students can enter a virtual world and interact with it in the comfort of their classroom. This digital world can take them to places that may not otherwise be logistically, financially, or physically possible.

Video games offer students the opportunity to work with a compelling problem (Echeverri & Sadler, 2011). Having an interesting puzzle to solve and combining it with the flexibility to explore the situation and approach the problem on the students' terms increases student motivation (Shin et al., 2012).

According to Echeyerri & Sadler (2011):

> Good games are designed to allow learners to develop their goals and achieve those goals at their own pace, customizing learning to the learner's level of proximal development. Games help learners scaffold acquired knowledge, building our way up to solving problems requiring increasingly complex critical reasoning. (p. 46)

Games allow students to combine freedom of choice with an intriguing problem that pushes them to create and solve a complex situation on their own terms.

Problem solving is one of the ways that video games not only entice students but help them develop a valuable skill. Participators in video games desire to reach the end of the simulation or goal of the game, which means they must adapt to whatever the environment throws at them, "This often leads to mistakes in the game from which they, in turn, also learn—to problem solve, if nothing else—and they continue playing, which encourages flexible thinking" (Witherspoon & Manning, 2012, p. 468-469). The ability to repeat a scenario and course correct or change the decisions that lead to an error promotes problem solving in a safe environment. Echeverri & Sadler (2011) state, "Failure is leveraged as an opportunity for constructive learning, as the game prompts learners that have erred forward by providing them with formative guidance to accomplish the given goal" (p. 46). Not only does failure become an opportunity but McAlister (2013) believes it can lead to greater motivation when there is an ever present opportunity for success. Repetitive game play leads to a more efficient strategy and eventual success if the scenario is approached enough times.

Several researchers have noted that video game play does not always lead to a better understanding of specific content. Given a biology simulation regarding plants, Muehrer, Jenson,

Friedberg, & Husain (2012) found students were “able to acquire the knowledge and skills needed to manipulate the games’ interfaces, resources and mechanics in such a way as to gain some degree of success in reaching the games’ victory conditions” (p. 802). Meeting the conditions to win a game cannot be the only reason to approach the simulation. Mifsud, Vella, & Camilleri (2013) describe the importance of structuring the video game experience with the curriculum in a way that supports specific learning goals. The experiences involved in correctly navigating the game must somehow develop the player’s understanding of the situation.

Teachers

The impact technology integration has on teachers cannot be understated. The way teachers engage in technology use has consequences in the way they train, teach, and perform administrative tasks. The perceptions and beliefs that teachers hold also come into play.

Teacher role. The increased use of mobile devices and new technology in schools has led to some interesting results for the role of the teacher. The importance of the teacher and the role he or she plays in the success or failure of technology use in the classroom cannot be overlooked (Bebell & Kay, 2010; Bebell & O'Dwyer, 2010; Laurillard, 2007; Rossing et al., 2012).

Teachers using technology. To understand this role, we must look at the way teachers are using technology in the classroom. According to Ertmer & Ottenbreit-Leftwich (2010), “We expect teachers to use technology in ways that extend and increase their effectiveness. It is no longer appropriate to suggest that teachers’ low-level uses of technology are adequate to meet the needs of the 21st-century learner” (p. 257). Administrators expect teachers to use technology in a multitude of ways to enhance their job as well as the learning experience. It would seem

hypocritical to expect heavy technology use from students without the same being true of the teacher. A few ways mobile devices are being used by teachers include "electronic record keeping, communication with other staff and parents via email, creation and management of web pages" (Bebell & Kay, 2010, p. 16) as well as searching for teaching resources in the digital world.

Ensuring proper use. Teachers have become the gatekeepers for technology in the classroom, essentially determining the time and ways that students use mobile devices during the school day (Bebell & Kay, 2010). The way the instructor orchestrates and delivers the timing and activities of the lesson will largely determine the scope and usage of mobile devices (Rossing et al., 2012). Part of the gatekeeping role is to maintain the physical devices themselves and the content that goes on them. The teacher is taking on the task of syncing devices to a common account where he or she has the administrative capacity for and responsibility of selecting the applications for the each device, managing content, and maintaining the central account that links to each device referred to by Crichton et al. (2012) as a "digital commons" (p. 28). Administrative syncing rights further adds to the power in the hands of the teacher since he or she can determine which aspects of tablet technology students have access to during school hours.

The changing role of the teacher. Technology implementation and educational reform commonly bring about a change in the end result or way the teacher performs his or her craft in the classroom (Berrett et al., 2012). Another one of these changes is a shift in the role of the teacher from disseminator of knowledge to that of a coach or facilitator of learning (Collins & Halverson, 2009). Lim et al. (2013) describe this change as teachers moving from "being the sole

source of information to a more complex role of negotiating lesson objectives with students, providing a varying degree of support for different students, monitoring students' progress, and encouraging reflection on classroom activities" (p. 59). Teachers are now managing the students as they navigate the learning process (Rossing et al., 2012). The instructor does not stand at the front of the room and give out information; instead he or she is able to promote independent learning (Clark & Luckin, 2013) and guide discussion using experience as a vehicle for understanding. Independent learning through trial and error encourages students to ask questions, which is a valuable ability (Collins & Halverson, 2009), and instructors can spend more time preparing for and answering unplanned student questions (Galligan et al., 2010).

The role a teacher has to fit into is being determined by what is actually practical in the world of increasing knowledge. One cannot know everything there is to know in order to adequately prepare for every possible eventuality. Collins and Halverson (2009) summarize the convergence of these two notions about learning everything versus only what is needed at a given time: "School fosters just in case learning while technology fosters just in time learning" (p. 48). There is a bridge between the two that teachers must somehow navigate.

In coaching and facilitating students to learn independently, teachers must also act as a filter or screen so that students can successfully traverse the digital world using a mobile device and accomplish their goals without getting swallowed by the sheer volume of digital content available.

Rossing et al., 2012 explains the importance of the filtering process:

> When students gain access to vast amounts of information, educators must provide direction and aid lest students become lost or overwhelmed. It is vital for educators to carefully test and curate reliable resources and to evaluate the validity of the information available within any given application. Educators must cultivate mobile information literacy in students so that they might make better evaluations and judgments when accessing information on their own. (p. 15)

Teachers must vet information to ensure it is reliable, usable, and safe for viewing. The teacher has the charge to take an overwhelming amount of information and content and strain out enough of it to make a task manageable but still enough of a challenge to push students. Students can use a mobile device in many ways to complete an assignment, so the teacher must "design tasks that are consistent with the curriculum and use the apps and the access to the Internet in integrated and meaningful ways" (Crichton et al., 2012, p. 29). Clark & Luckin (2013) found that teachers who could successfully integrate the challenge of filtering content, coaching students to think independently, and tie tablet use to a curricular purpose were able to effectively meet the differing needs of students.

Professional learning. To more effectively shift toward a facilitation role and successfully use technology in the classroom, teachers need training and development. As technology changes and is updated, VanVooren, DeVore, and Ambriz-Galaviz, (2011) state, "An investment must be made on a continuous basis for the training of teachers" (p. 30). Research shows not only that teachers are in need of consistent training but that the training needs to specifically target how teachers can incorporate technology into their lessons as opposed to only training them on how to use new technology (Storz & Hoffman, 2013). Teachers that do not

receive specific direction on how to integrate technology into the context of a lesson or project, are much more likely to "use technology within their existing practice" (Mouza, 2008, p. 450). It can be difficult to utilize a tool if it is unfamiliar or to utilize a familiar tool in a new way if there is no example to follow. Mouza (2008) describes technology integration as something that is taught and rather than being intuitive; if left unstructured it is not going to just happen on its own. Ertmer et al. (2010) explain the importance of specificity "when introducing inservice teachers to specific technology tools, it is important that professional development programs also include information about how they can use these tools in very specific ways, within specific content domains, to increase student content learning outcomes" (p. 272). A detailed explanation gives increased opportunity for better understanding and correct application in an appropriate context.

In addition to targeting a specific lesson or skill, professional development for teachers should occur on a continuous basis. The use of a mobile device in the classroom is not a static experience and in order for pedagogy and technical skills to improve there must be ongoing professional development (Teo, 2012). Educators are in need of consistent follow up and support so they can maintain skills (Kopcha, 2012). Educators must change and adapt their skills to align with the changes and adaptations of technology tools.

Educators are continuously trained to maintain and enhance their skills, so they need opportunities to participate as learners. Teachers want to learn (Storz, 2013) so they can become better at their trade. Crichton et al. (2012) explain, "Teachers need to be treated as learners and their learning must be honored and personalized and supported. They need to be introduced to

new technologies as learners first, before being called upon to use the technologies in their professional practice" (p. 29).

Educators are also learning how to adapt their classroom management as their classroom shifts towards a less centralized format. As more mobile devices are being used in classrooms, students are gaining more freedoms and teachers often worry about the potential distractions (Merchant, 2012). The management of activities and lesson pacing becomes critical as there are multiple groups of students participating in different activities (Lim et al., 2005). The implementation of more technology into classrooms is leading to behavior changes in both the learner and the educator, making it vital to have a strategy for facilitating such an atmosphere (Laurillard, 2007). An environment that centers around information communication technology needs constant monitoring to make sure that chaos does not erupt (Lim et al., 2005).

Resistance. As educators work to grow and develop themselves through incorporating mobile technologies into their daily work routine, it is not uncommon to encounter a degree of resistance to change. Berrett et al. (2012) says, "Technology integration in schools has been around for decades and so is the seemingly automatic resistance to it in the educational system" (p. 215). Technology fundamentally changes the model of education in the classroom and the flow of power because the process is no longer a lockstep linear process that flows from the teacher to the students (Collins & Halverson, 2009). The technology-integrated classroom is fluid, with more than one learning situation occurring at once and such learning may even be self-directed. The use of new technologies can have a destabilizing effect, opening up students to new ways of learning that can create different demands on the teacher (Merchant, 2012).

The state of education and the functioning of a classroom can be a difficult place to change because it has reached a condition of equilibrium (Collins & Halverson, 2009; Lim et al., 2013). The people navigating the system are comfortable with the status quo and do not want to rock the boat. Laferrière et al. (2013) discuss the introduction of new technology as a challenge to the normal way of doing things, which often leads to tensions and push back. If the current condition of a school or classroom is in a state of equilibrium, then changes made to part of the system can push up against a restorative force in the opposite direction (Collins & Halverson, 2009). The education system is strong and not easily shaken from its way of doing things (Laurillard, 2007). Implementing technology comes with a disruptive impact and not everyone is willing to accept the change.

Technology implementation also comes with a level of demand on the time of the users and can lead to uncertainty about how the end result will turn out. When an organization introduces new technology, there are normally individuals within the group that resist or will push back against the new in favor of what has worked in the past (Bebell & Kay 2010). Teachers want to know how a new way of doing things will work and what it looks like on a daily basis in order to understand its impact on running a classroom. Many educators will resist technology change that is not well thought out and planned with students in mind; agents of change must manage the expectations of teachers and anticipate their objections (Adiguzel et al., 2011). One of these objections is time which is a commodity to teachers and "integrating technology requires planning, teaching, and classroom management practices that are new to many teachers and demands attention that is not normally spent in those areas" (Kopcha, 2012, p. 1118). It is not realistic to demand time from teachers without getting some sort of push back. If

time is viewed on a scale, removal from one side ought to be compensated with something on the other.

Some teachers find it easier to avoid the change to such a technology centric classroom rather than going through the steps that are necessary to achieve the goal. The effort involved in making a change lead teachers to "feel like they are not doing what they are trained to do—that is, passing on their expertise to students" (Collins & Halverson, 2009 p. 41-42). Schools are having to address a growing variety of perspectives and extend the skills of both teachers and students which would mean more changes (VanVooren et al., 2011), and in some cases educational institutions are just restricting the use of mobile devices altogether (Merchant, 2012). There is also a culture in some schools that views the use of technology for assignments as a form of cheating because to truly know something should not depend on the aid of a mobile device (Collins & Halverson, 2009).

Perception and beliefs. Educator perceptions and beliefs about technology are a factor in determining when and if a teacher is incorporating technology into his or her classroom. Adiguzel et al. (2011) found that while teachers are generally open to developing their expertise, implementation of technology is complicated and requires a lot of effort to coordinate and because of this beliefs and perceptions play a role in the desire for a teacher to push through the initial stages into routine classroom use. Some teachers have the training necessary to support them and prepare for the task of incorporating new technologies into their daily lessons but have still reported a negative perception with regard to how much of their time is consumed (Kopcha, 2012).

On the other hand, there is a growing sentiment that mobile technologies are perceived or believed to be useful to teachers. One study found that teachers who believed in technology use for collaborative purposes, student choice, and creating a variety of ways for students to demonstrate learning were able to make technology work for each of those scenarios (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012). In fact the same participants from that study went on to describe their beliefs as one of the sustaining factors that allowed them to be successful with technology use in the classroom. Other teachers have perceived tablets to be a time saving and efficient way to teach and have therefore incorporated them into their lessons (Clark & Luckin, 2013). The perceived ease of use for mobile technologies is also being considered by teachers who are in the process of accepting or rejecting these devices for use with their students (Adiguzel et al., 2011).

Leaders

Leaders play an integral role in the implementation of technology (Berrett et al., 2012). The characteristics that define them as leaders and the vision they have for the project are factors. Their example of technology use plays into the culture of a school as well (Byrom & Bingham, 2001). Leaders are also responsible for understanding the financial ramifications and being accountable for fiscally responsible decision making.

Leadership characteristics. The successful implementation of a new technology within a campus or district requires a leader who has certain characteristics. It is essential to examine an administrator in the context of his or her role as leader in order to better understand technology integration (Berrett et al., 2012). New ventures and projects are started all the time; some of them succeed while others fail. Initiating infrastructure, training, and the creation of a budget are

necessities but the greatest impact comes from the establishment of technology leadership (Anderson & Dexter, 2005).

A truly powerful leader is a person willing to share his or her leadership with the greater community of individuals involved in the process (Marks & Printy, 2003). Shared leadership creates a sense of stability among multiple participants leading to a stronger implementation (Berrett et al., 2012). Organizations and communities consist of a heterogeneous group of individuals so development of a technology team or committee becomes important when making decisions regarding such a group (Byrom & Bingham, 2001). Shared leadership is not a passive activity but instead, "Shared instructional leadership involves the active collaboration of principal and teachers on curriculum, instruction, and assessment" (Marks & Printy, 2003, p. 371). The goal of the leader is not to hoard the decision making ability or to make his or her power known to others. Some leaders looking to empower others even go as far as removing the symbols of leadership that can serve as a dividing line such as a parking space or a certain seat at the table in an effort to promote a shared community (Doyle, 2004).

Sharing leadership with a larger group of individuals also develops the leader as a person who delegates, places people in their areas of strength, and demonstrates trust. During implementation of new instructional technology, a leader seeks out individuals to see what their area of expertise is and places them in a role to capitalize on that experience (Marks & Printy, 2003). Showing an interest in people and letting the group make decisions deepens the trust that the organization has for their leader (Byrom & Bingham, 2001). A leader must learn about his or her people so they can anchor their knowledge and place them in the optimal place for successful

implementation (Berrett et al., 2012). Every system has points of leverage that when accessed with the proper skills and resources can effect real change (Collins & Halverson, 2009).

A part of carrying out a technology change includes the building of support structures for issues that could come up after the initial stage of setup occurs. The ability of a leader to consider needs and supports that may become necessary depends heavily upon his or her aptitude for listening to their teachers (Berrett et al., 2012). Engaging in sustained dialogue with teachers is one of the ways to learn about their needs and determine potential opportunities to support them (Marks & Printy, 2003). Who knows the needs of each particular classroom better than the individual who spends all day in there? When setting up supports for educators, there needs to be a foundation of easy wins and successes to build up confidence not only in the teachers themselves but in the technology for its ongoing use. Teo (2012) simply says, "To support teachers in their use of technology, school administrators should devise implementation strategies and ensure effective support structures that foster successful experiences in the use of technology for teachers" (p. 14).

A technology implementation also requires a person who can deal with and manage change effectively. The importance of handling change necessitates finding somebody who is not only knowledgable but flexible as well. VanVooren et al. (2011) describes the situation, saying "There is an urgency to bring the most recent technology systems, applications, and strategies into the educational organization, creating an environment that requires knowledgeable leaders to manage the rapid change" (p. 28). Flexibility and knowledge are essential in managing a change that applies new technology specifically to a school since there may be a need to adapt some of it

(Hayes, 2006). A leader must be able to facilitate all of the aspects of a change without dictating everything that happens (Berrett, 2012) and at the same time must understand the new technology enough to set reasonable expectations for those involved in the process (Collins & Halverson, 2009).

Vision. Balancing all of the change, working with the people involved, and still managing to make the implementation about advancing the curriculum with the use of technology emphasizes the importance of a vision and plan. According to Ertmer & Ottenbreit-Leftwich, (2010) if a school or district has made technology implementation a priority then, "One of the primary roles of school leadership is to support teachers and create a shared vision for technology use" (p. 275). Berrett et al. (2012) note that "Leaders within a district or school need to clearly define and articulate the technology integration and what its function in the school community is" (p. 203). A principal has to be able to set the scene for what is possible and why it is important and still be able to work with the people who will carry out the vision (Byrom & Bingham, 2001). In order for a leader to effectively cast and maintain vision for their organization, he or she must communicate the message consistently and simply so that there is no doubt about the direction everyone is moving (Hayes, 2006).

If leadership casts a vision for the integration of technology in an organization, a well thought out plan must be in place to ensure the changes align with the vision. The incorporation of mobile technologies into a large organization necessitates the rationale for such a decision should be clearly defined and long-term plans must consider consequences before, during, and after implementation (Clark & Luckin, 2013). Radical changes aimed at making sustained improvements to the education in a school or district have to be planned and the plan has to be

managed because an organization that is fully exploiting digital technology will have educators and students who are behaving differently (Laurillard, 2007).

Leaders using technology. As a person who sets vision and shares leadership with a committed group of people, the leader is not exempt from using technology him or herself. It is vital to the credibility of the principal and instructional leader to model the use of technology that he or she expects from the rest of the faculty. Principals must be engaged learners who can admit that they do not know everything about technology but are willing to learn and take chances in front of the people they hope to gain as followers (Demski, 2012). Barret et al. (2012) say, "Leading by example is mandatory for those trying to integrate technology into their schools" (p. 203). A leader who demands technology use in a variety of ways and sets it as an expectation but does not use it him or herself sends a mixed message (Byrom & Bingham, 2001).

> When evaluating school technology leadership, Anderson & Dexter (2005) found: technology leaders must be actively involved with technology—crafting policies, using e-mail, and generally spending time on it. In other words, our results suggest that a school's technology efforts are seriously threatened unless key administrators become active technology leaders in a school. (p. 74)

Educational leaders must use technology and demonstrate their commitment when implementing a new technology. To do less is to put the initiative in jeopardy before it can even get off the ground.

Culture. The culture in a school or district can have a dramatic impact on the success or failure of a change initiative (Berrett et al., 2012). It is up to the leader to create a culture that engenders a positive response and commitment to making the implementation successful. One

way to influence the culture can be something as seemingly simple as how well a leader facilitates open and honest communication between themselves and between other teachers (Berrett et al., 2012).

Part of an administrator's task is to not only communicate to his or her staff but to continue to learn him or herself and not concede to leaving the learning to the students only. Crichton et al. (2012) describes teachers as learners that need an introduction to new technology similarly to the way students are; there is a period of trial and error during adoption that enables the user to learn the device for him or herself. This part of a school culture needs to be cultivated and encouraged by every member of the staff. Information and communication technologies are frequently learned through informal experimental situations by teachers who are playing with the technology to see what it can do (Hayes, 2006). Administrators who build a place where teachers not only experiment but even fail at times, in an effort to learn, are creating a culture and atmosphere where novelty can occur. According to Byrom & Bingham (2001) "As teachers try new strategies and adopt new technologies, they are bound to stumble; it is up to the principal to assure them that it is okay to be less than graceful as they are learning" (p. 7).

Another cultural issue that leaders need to address is how well they position their organization to embrace technology and adapt to change (Adiguzel et al., 2011). Administrators need to provide the resources that teachers need in order to be successful with new technology (Ertmer & Ottenbreit-Leftwich, 2010). Building an adequate resource base for technology demonstrates its importance and makes it a priority for the staff to use. There is a mindset among many teachers and parents that mobile devices are a disruptive force in the formal classroom and

it is up to the leadership to shift that perspective and help the community embrace their use (Merchant, 2012).

Technology is also considered a disruption by those who view its use as akin to cheating, because truly demonstrating learning should not require resources outside the classroom or textbook (Collins & Halverson, 2009). These are deeply embedded beliefs in schools and communities that leaders are having to push back against in an effort to change the culture. Administrators must walk a fine line in order to change the minds of the old guard as well as to guide the new generation of teachers when educating a technology savvy generation. There is an optimal amount of stress that must be applied to motivate a staff to transform their habits, their teaching, and their mindset with constantly changing technology while at the same time not pushing too hard or too fast leading to more resistance (VanVooren et al., 2011). In order to change attitudes and beliefs, administrators are doing things like increasing the ease with which technology is accessed, stepping up the quality of the technology available, providing more support in a timely fashion, and getting more training but all of these issues tie together through the promotion and value of technology that is shown from leadership (Bebell & Kay, 2010).

Fiscally responsible decision making. Fiscal accountability is an issue that all districts receiving state funds must contend with in order to keep the dollars coming. There is a need to monitor when and how investments of resources are made as well as why they are made.

> Bebell and O'Dwyer (2010) state: Over the past decade the belief that increased access and use of computers (and digital technology tools) would lead to improved teaching and learning, greater efficiency, and the development of critical skills in students motivated

> educational leaders and policy makers to make substantial investments in educational technologies. (p. 5)

Following dollars ultimately needs to lead to student achievement. Enomoto and Conley (2007) discuss the opportunity for schools that are reaching students and helping them to achieve to have a greater level of flexibility for their resources and operations. Conversely campuses failing to produce student achievement will face the prospect of limited options with how they allocate their resources. Schools and districts not held accountable for their spending run the risk of making decisions based on the faculty and staff rather than the students. Adiguzel, Capraro, and Willson (2011) insist that, "administrators should ensure that technologies are being used correctly for the appropriate reasons, and that they are being leveraged to support the teacher's and school's overall instructional and achievement goals" (p. 16). Each campus leader is responsible for ensuring that funding allocation creates an environment for academic student success.

Given the not-so-distant economic downturn that led to many teacher layoffs and a tremendous amount of uncertainty, districts are under the microscope like never before and their decisions as well as their spending are scrutinized constantly (Rivero, 2009). The decision to purchase and introduce costly technology should not be taken lightly. Technology requires resources and according to Adiguzel, Capraro, and Willson (2011), "Education stakeholders have invested significant time and financial resources introducing technology to schools and teachers" (p. 13). It is not simply enough to say that technology is helpful and makes schools better, administrators need to understand whether or not a tangible benefit exists (Laurillard,

2007). Understanding the relationship between cost and potential benefits aids leadership in the decision making process.

Facilitators, Learning Opportunities, and Challenges

In order to successfully integrate tablets into a school, the devices need to be explored to understand what comes with them. Incorporating new technologies into an organization includes factors that facilitate their use as well as challenges to address.

Facilitators of Technology

Facilitating factors range from the features built into devices, external factors, and ways technology might be used by students, teachers, or administrators.

Connection through the web. Technology is becoming easier to integrate into the field of education because of the many facilitators that enable its practical use. One factor that facilitates the use of technology in education is the use of the internet. Students can use a piece of technology to connect themselves to others in different rooms, buildings, cities, states, or even countries. The internet also allows users to find content about topics through a search engine that potentially generates hundreds of thousands of webpages of information. Storz and Hoffman (2013) discuss easier access to the internet as a means for students conducting efficient and engaging research. The internet can facilitate a level of connection that is far greater than the reach of students that are limited to nothing more than a textbook, pencil, and paper.

In reference to the opportunity to connect students across schools, Risinger (2007) notes:

> The Internet has so many advantages over writing letters and using the mail service. Pictures, maps, and other graphics--even videos--can be transmitted instantly to partner

> classrooms or schools. Entire classes can meet each other and learn about each other's school, community, and culture. (p. 380)

Students are able to experience and interact with individuals and groups across city and state lines or entirely different cultures in other parts of the world without leaving their own classroom. Putting content to access through the web also allows portability of learning so the education does not have to stop when a student leaves the classroom but can continue wherever they go as long as they have an internet connection. Hutchison et al. (2012) discuss how mobile technologies such as a tablet "encourage ubiquitous learning through their ease of portability and access to information that can allow for learning to occur" (p. 15).

Wifi. Another facilitator of technology is the prolific distance covered by wifi, or local access wireless networks. These networks typically span 300 to 1,000 feet and allow access throughout a school building, home, and parts of a community (Forlano, 2009). Forlano (2009) comments, "Mobile phones are commonplace, and laptops are increasingly accessing the Internet wirelessly in cafe´s, parks, and public spaces" (p. 344). Users are not tied by an ethernet cable to the wall but have the ability to use the space they are in to explore and due to more places providing wifi access there are more places from which to explore. Reading, writing, drawing, and communication can occur simultaneously and instantaneously throughout the same building or at home or in a coffee shop. Wifi networks add another way to enjoy a device by connecting it to other information. A piece of technology not connected using wifi is limited by the constraints of the software on the device. Connection via wifi immediately adds a new dimension of possible

achievement ranging from email, messaging, posting, downloading, sharing, video chatting or uploading content.

Cost of technology. An additional factor that is promoting the possibility for technology use in education is the decreasing cost of technology. Computers were once only affordable for large companies, but now are reasonably priced for household purchase. According to Giles (2011), "A gigabyte (GB) of storage, which is roughly enough to hold a two-hour film after compression, cost around $200,000 in 1980; today a disk drive holding a terabyte, or 1,024GB, costs around $100" (p. 5). Cell phones and tablets are becoming commonplace in more and more homes. The newest technology is a little more expensive but the older models get discounted, which makes them easier to purchase. Schools are able to purchase more devices because of the decreasing price, which means it is becoming more economical for a larger number of students to have or use a device. Educational discounts and buying in bulk also make purchasing technology a viable and appealing option. Johnson (2012) promotes this through buying in large groups: "Although technology products and services can be expensive, the industry is also intensely competitive. Savvy educators can use that competitive environment to their advantage" (p. 31).

Synchronization. Another facilitator of technology use in education is the complementary fashion in which technology communicates in its various forms. Crichton, Pegler, and White (2012) conducted a study using iPods, iPads, and laptops where "all the iDevices used in a classroom were synced / connected to one iTunes account managed by the individual teacher responsible for the content and application selection" (p. 28). The ability to sync devices allowed for centralized distribution of content by the teacher. Desktops, laptops,

tablets, and phones can all communicate with each other relatively easily and the ability to use the cloud allows these devices to sync and share information so any addition to one device is automatically incorporated into the others (Rossing et al., 2012). The same programs and applications can be created for each device so the user can maintain connection and usage whether they are stationary at a desk or on the go (Murray & Olcese, 2011). Mobile devices are able to work in an interconnected way instead of as separate silos.

Learning Opportunities

Mobile device integration and use presents numerous possibilities for education. The way in which technology is used could impact the way educators prepare and teach lessons. It could also change the time, place, and manner students participate in lessons. Although not new, mobile and asynchronous learning opportunities are supported by tablets.

Mobile learning. Mobile devices gave birth to a way of learning called mobile learning. Yousuf (2007) defines mobile learning as:

> The provision of education and training on mobile devices: Personal Digital Assistants (PDAs), smart phones and mobile phones. One of the characteristics of mobile learning is that it uses devices which citizens are used to carrying everywhere with them, which they regard as friendly and personal devices, which are cheap and easy to use, which they use constantly in all walks of life and in a variety of different settings, except education. (p. 117)

Mobile learning is occurring because digital devices have the capacity to support and facilitate a user's access to information and participation in activities from a variety of places. The use of a

device that is portable and comfortable for students is a significant factor in harnessing mobile learning as a potential medium for education (Fuegen, 2012).

Collaboration. Mobile learning has increased access to information and given new meaning to the notions of space and collaboration. Devices connected to the internet give users the tools to retrieve learning material from anywhere they have a signal (Yousuf, 2007). Students can not only retrieve learning material from just about anywhere but they can also obtain it instantly and with less effort when compared to previous technologies (Traxler, 2010).

The promise of collaboration appeals to many organizations attempting to integrate mobile devices such as tablets into their daily functions. Mobile technologies offer the ability to create an impromptu Bluetooth or Wi-Fi network using the devices for instant collaboration on a team project (Fernandez-Lopez at al., 2013). Resources are easily viewable and sharable among members of a group which encourages members to work with one another instead of in isolation (Rossing et al., 2012). Work can be created and edited by users simultaneously and shared in an instant making the iterative process of learning with a group logistically sound. Work can be synchronized into a single deliverable via a wireless network to save time and is possible whether members are in the same room or distant from one another (Rossing et al., 2012). The ever growing library of applications that are in development for tablets also encourage collaboration because many of them facilitate project or group work (Clark & Luckin, 2013; Rossing et al., 2012).

Mobile devices not only increase access to information but to people as well; these devices are changing the dynamics of collaborative endeavors by creating more channels with which to work with one or more individuals. As Rossing et al. (2012) say, “Learning with mobile

technology allows students, then, to expand discussion and investigation beyond the walls of the classroom. It enables students to collaborate and create knowledge and to interact with a larger range of content" (p. 3). Conversations do not have to occur face to face but can still have a similar effect when done through a video chat, message, email, or combination. The essence of how a discussion happens is being redefined by mobile technologies (Crichton et al., 2012).

Expanding the learning space. An evolution in the way individuals collaborate and discuss topics using mobile technology has also led to a new way of looking at physical space. The fact that books, music, and other media can or are becoming digitized means users are not tethered to a library, shelf, wall, or cumbersome player in order to access the content they want (Traxler, 2010). These "physical artifacts" (Traxler, 2010, p. 153) are becoming less and less of what delivers content to learners thereby liberating students from the confines of proximity to them. The space in which students now roam and explore to gain understanding about an issue is increasing because of digital content while they themselves do not actually have to change their geography. An example of this expanded freedom is seen in a digital virtual space that has ample room for exploration and creation (Crichton at al., 2012). The redefining of space has occurred largely in part because technology is becoming less static and more dynamic allowing devices to move with users wherever they go (Merchant, 2012). As digital geography expands, physical geography is essentially shrinking and what was once a clearly defined line between public and private spaces is now a blurred area where relationships move fluidly back and forth (Crichton et al., 2012).

Since a mobile device is not secured to a specific room, locations inside and outside of a school building become a setting for utilizing devices in multiple ways or for multiple purposes.

Swan, van't Hooft, Kratcoski, and Unger (2005) claim, "…because of their small size, handheld computing devices no longer constrain users in the way desktop computers or even laptops do. As such, handheld computers support learning outside the classroom, twenty-four hours a day, seven days a week" (p. 100). If one of the goals of technology is to make life better or easier then mobility in an educational setting would make things better.

Connectivity. Mobility is complemented by increased connectivity, allowing users to access vast amounts of information while on the go (Crichton et al., 2012). Hutchison, Beschorner, and Schmidt-Crawford (2012) believe tablets "encourage ubiquitous learning through their ease of portability and access to information that can allow for learning to occur" (p. 15). Tablet technology empowers users to reach out and take hold of enormous quantities of information with a speed and ease that previous mobile device users have not achieved (Rossing et al., 2012). A project can be worked on and every step can be completed from creating plan, to researching it, and developing a solution. One of the key benefits to increased mobility and connectivity is the opportunity for work to continue at a consistent pace rather than a stop and start rhythm.

Asynchronous learning. Asynchronous learning is a natural extension of mobile device use. Self-selection becomes a powerful force as described by Traxler (2010) who says, "choice and control are exercised at a purely personal level, allowing individuals to each pursue their own curiosity, constructing their own private libraries and inhabiting their own worlds of knowledge" (p. 155). This type of learning avenue is giving students a customized education that

allows them to meet their own needs and generate their own repository of knowledge and skills they deem necessary.

Flexibility in time is another feature being utilized by students in asynchronous learning environments. Learning environments like these do not restrict students to a particular time and/or day to engage in a learning activity or communicate with someone and they also allows more time for students to collect their thoughts when responding to a question or prompt (Skylar, 2009; Traxler, 2010). Loosening the grip that time constraint has on learners adds to their sense of freedom to initiate and complete learning activities on their own timetable (Rossing et al, 2012). Since time is a resource that can never be recovered once it has passed, students can use mobile devices as a means to make the most of their time by accessing their desired content at any point day or night instead of having to work everything around a class session (Swan et al., 2005). Anytime access gives a user the opportunity to maximize the precious resource of time and redistribute it in a way that suites he or she best.

Asynchronous learning lets the student apply a level of convenience to their learning (Fuegen, 2012) and schedule activities or coordinate when they want to view something so that they can maximize their learning time and personal time (Crichton et al., 2012). Schedule convenience and flexibility are additionally aided by the functionality of mobile devices and the ease with which they can take a user from a professional endeavor to a personal one or vice versa, allowing users a fluid, dynamic experience with their technology and the topic they are learning about (Clark & Luckin, 2013). Collins and Halverson (2009) sum up the issue of flexibility by stating that, "School fosters just in case learning while technology fosters just in time learning" (p. 48). Mobile devices allow learners to wait until the most opportune time and

then self-select only learn what they need in that moment in order to accomplish their current goal.

The combination of flexibility in time and space removes restrictions and gives learners a tremendous level of autonomy. This level of autonomy reinforced by the variety of choice mobile devices offers creates learning in a non linear environment. Asynchronous learning is putting the power of choice with regard to variety and options of how, when, and where content delivery occurs into the hands of students (Clark & Luckin, 2013; Mouza, 2008; Traxler, 2010). Learners are not forced into a specific video, lecture, or book but get to pick their own resource from a variety of selections or find their own somewhere else. Tools that are currently being used in asynchronous courses include streamed audio and video (Skylar, 2009), podcast lectures, educational apps, and social networking platforms (Rossing et al., 2012). As time and space diminish as an influential factor and more tools and resources become available, asynchronous learning is giving students power to direct their learning in a way that previous generations were not able to experience.

Increased communication. Ease of communication also comes along with widespread distribution and incorporation of tablets into an organization. According to Clark & Luckin (2013), "Teachers, students and parents report that the multiple communication features, routine availability and easy accessibility of iPads in the classroom and in students' homes make communication between teachers and students, and school and home easier and more routine" (p. 2-3). Teachers, students and parents can use functions such as email, short message service, video chatting or log into a forum or website set up for communication in order to send a message, ask questions, submit assignments, have conversations or set up a conference. Students

can also access social media in order to express themselves or share information with one another (Peluso, 2012). The incorporation of technology and media into the lives of students is not going away, so Collins and Halverson (2009) suggest that parents use these tools as a way to engage their children.

Fast learning curve. An additional promise of tablet implementation is a quick learning period. Tablet usage is natural to many students (Fernandez-Lopez at al., 2013), which makes it ideal because the responsiveness of the touch screen leads to interaction that can instantly be seen. According to Crichton et al. (2012) tablets have a "short learning curve" (p. 29), which gives students more time to apply the technology towards practical activities rather than spend most of their time learning how to use the device.

Flexibility in use. Students and teachers will also notice increased flexibility in terms of what tasks can be done and how those tasks can be achieved on a tablet (Storz & Hoffman, 2013). Tablets detect the motion of the device which can in turn be interpreted as input (Fernandez-Lopez at al., 2013). The simple act of moving or turning the device itself becomes a method of utilizing the tool. Tablets can be connected with additional technologies to display and use media such as audio and video or internet based sites can be accessed to complement the mobile device (Yousuf, 2007). The ability to access multimedia content, a mobile device acts as a gateway tool that allows other tools to stitch together into a purposeful creation that otherwise would not have been available in the same place. Mobile technologies now have more power to make greater use from multimedia capabilities (Adiguzel et al., 2011), so students and teachers alike can have variety in what they choose to pursue and how they approach their demonstration of learning.

Challenges to Technology Integration

Along with facilitators and possibilities of technology, there are also challenges that come with integration. Many of these obstacles hinge around logistical issues and the way users choose to operate devices. There are a number of factors that need to align in order to distribute, operate, and maintain technology. In addition, proper use requires consistent monitoring.

Logistical hurdles. Even though mobile technologies seem to be shrinking the globe while expanding the digital world, these devices do come with their own set of logistical hurdles that users must maneuver around in order to sustain their use. "Clearly, effectively integrating technology into learning systems is much more complicated than for example providing computers and securing a connection to the internet" (Lim et al., 2013, p. 65).

Infrastructure changes. One of the complications that implementers are navigating is modifying existing buildings. Schools must lay cable and make structural changes to create the infrastructure necessary for mobile device usage (Hayes, 2006). Building layout and design both have an impact on the types of changes that can be made which can limit what can actually be done. A critical component for mobile devices on a campus is a wireless network that can be accessed by all devices, a situation that further adds to required building changes (Crichton et al., 2012). Material choices along with the structure of a building and the location of its rooms factor into the signal strength of wifi in each part of the building.

Account management. On top of building infrastructure, campuses are also having to consider the details of account management across devices. Someone has to sync multiple apps across multiple devices so that each piece of technology has the same resources and content (Pegrum, Oakley & Faulkner, 2013). Devices will need to have their content managed by

someone who has the administrative capacity to add or delete apps, update them, and have a common place to store them (Crichton et al., 2012). It is also necessary for someone to manage accounts that are associated with each device whether that person has a centralized account or multiple ones (Crichton et al., 2012). Since technological expertise at each campus varies, local resources are being heavily relied upon to accomplish some of the day to day details of device usage (Hayes, 2006). Along with software maintenance, hardware needs to be sustained by an administrator as it encounters wear and tear. The team in charge of technology services also needs to pay special attention to the needs of equipment maintenance (Swan et al., 2005).

Acceptable use policy. Ethical considerations and acceptable use issues are another component for mobile device use on campuses. Schools are addressing ways to deal with digital safety and cyberbullying to ensure they have considered avenues for improper usage and creating precautions to avoid them (Pegrum et al., 2013). Campuses that allow students to bring their own devices are not exempt from acceptable use polices and need to clearly communicate the rules to ensure full understanding (Crichton et al., 2012). Due to the changing nature of technology and its widespread availability, acceptable use policies will need to evolve over time in order to maintain usage in a safe manner (Traxler, 2010). All of these issues need thorough consideration and planning prior to implementation in an effort to make the transition to a mobile device friendly campus as smooth as possible.

Purchasing. Purchasing devices for use presents one of the factors for navigation. Bulk ordering for an educational institution should create some sort of price break or discount that is worked out during the purchasing phase of the implementation. Shoop (2009) notes that, "competitive bids and the bid-opening process are the cornerstones of public school

purchasing" (p. 28). Once all of the tablets purchased and received, there must be a process to ensure that each tablet has the appropriate software and applications installed and ready for the end user.

Perils. The promises that come with a new change or technology are no doubt enticing but there is also the potential for risks that can undermine or even derail well planned or good intentioned initiatives. One of the potential perils involved with a tablet implementation is a lack of understanding of what the technology can do and what it should be used to accomplish (Berrett et al., 2012). Giving a student or teacher a tablet, which is another tool in their disposal, does not lead to effective use of the tool itself. Even though they may be able to utilize its basic functions, there is no guarantee that optimal use will occur. There is a common assumption that young people are fluent with technology use and inherently know what to do and how to use new devices, but that can be a dangerous assumption especially in a large population (Peluso, 2012). An unclear understanding about what to do with tablets and how to use them can be further compounded by a lack of support from school leadership (Berrett et al., 2012).

Inadequate use. Although an unclear purpose for using a technology is a clear problem, another one that can crop up and is closely related is inadequate use of technology. A lack of optimal technology use can happen when incorporating devices or programs into an existing process that was originally used differently (Adiguzel et al., 2011). Inadequate use of technology means that tasks could be done better and resources are not being exploited optimally. In other words the return on investment is not maximized because the investment is only partially used. Due to the issues of limited funding when policymakers allocate money, leadership is held accountable for the outcome and a visible return on investment is required (Lim et al., 2013).

Misuse. While leaders and teachers push to know how to use tablets purposefully and effectively, there is a potential hazard that some individuals will choose to misuse technology. Incorporating new technologies can come with gaps in the security of usage because new resources plug into a hole that was shaped for a previous technology or tool. The process of filling these gaps and bringing a new device online in an organization may lead some participants to misuse use the tool (Adiguzel et al., 2011). There is tremendous pressure to ensure that students and teachers alike are making desirable choices with how they use technology (Lim et al., 2013).

Too much data access. Although access to information is often seen as a benefit to tablet use, it is also a potentially perilous situation because students may gain access to too much information. Technology does not differentiate the information that can be accessed and what comes across the screen is the same no matter who is viewing it (Lim et al., 2013). Data accessed on a tablet is easily shared (Crichton, 2012) and would be problematic if the information is sensitive or inappropriate for a certain audience. This misuse of technology is addressed with acceptable use policies but cannot be completely avoided.

Conflicting interests. An additional consideration regarding hazardous change brought about through tablet implementation is the issue of conflicting interests of an organization and its members. Schools must always be on the lookout for what is next, how to develop their staff for it, and how to prepare their facilities accordingly. Planning for future needs is a critical component of tablet computing because the technology is in a state of constant evolution, so by the time one iteration of the technology implement occurs there are already new changes in the queue (Clark & Luckin, 2013). While the process of using tablet technology is a fast changing

phenomenon, the organization and teachers within are frequently slow moving and take change at a slower pace (VanVooren et al., 2011). These two are at odds with one another and can make for a challenging transition that generates more friction than is desirable.

Customized solutions. A final hurdle to consider is that technology is not a one-size-fits-all endeavor but requires customized solutions to address institutions and organizations in specific ways. Technology does not always work as it is intended and set up can be tedious and time consuming (Galligan et al., 2010), which requires a personalized solution in order to make it fit an older building, compatible for use in a larger network, or become compatible with existing technologies and infrastructure. Hayes (2006) describes this situation as follows: "Each school generates a unique set of context-bound challenges that require locally developed practical solutions" (p. 576). Along with the logistics of setup come unavoidable details to address, such as cost regarding who will pay for the technology, insurance, etc. and ownership issues, such as whether or not the devices will stay on campus, whether they will eventually become property of the user, or whether or not students will have the option to bring their own device from home if they prefer (Merchant, 2012). Each of these situations does not have a clean blanket statement answer because each school has a specific context and it is within that context they formulate their answers.

Overall tablets impact students, teachers, and leaders in a dramatic fashion. Each of these stakeholders plays a role in the development and use of tablets determining in large part their success or failure as an initiative. It is critical to understand their needs and goals in order to effectively address them for a successful implementation. While understanding these groups,

leadership must simultaneously learn about and understand tablet technology threats as well in order to make an informed decision and plan accordingly.

Threats. This amazing new sandbox that students and teachers get to play in does not come without its own set of threats. VanVooren et al., (2011) describe the current landscape saying "Today's schools and organizations are challenged with tightening budgets, rising accountability mandates, technological advances, and the continuous demographic changes within the institutions" (p. 30).

Price. One of the concerns that comes with technology integration is the cost. Technology is an investment and like any other investment there is a cost and a benefit to analyze in order to determine if it is worth the risk. According to Johnson (2012), "Finance in schools is a zero-sum game. Districts have a finite amount of money, so any funds expended on technology are funds not spent to reduce class sizes, buy science lab equipment, or train teachers" (p. 30). Does the upside for potential benefits outweigh the potential costs if the investment fails? Everything costs money and when schools are potentially purchasing something for every teacher and possibly student, then the bill adds up quickly. As explained by James, Pate, Leech, Martin, Brockmeier, and Dees (2011), "Faced with the reality of diminished financial resources, policy and decision makers need to know if spending in one area influences student achievement more than spending in another area" (p. 2).

Obsolescence. Technology will continue its march forward inevitably leading to smaller microchips, faster processing, and outdated hardware that will have to be swapped out eventually

(Lim et al., 2013). Johnson (2012) asserts that "A sustainable technology practice means not purchasing more technology than a school can regularly maintain, upgrade, and replace" (p. 31).

Digital safety. As a school district implements tablets as part of a technology initiative, safety becomes paramount due to the potential for the majority of participants in a district to participate and use new devices. In order to avoid or limit viruses and inappropriate web browsing, technology departments must put controls and firewalls in place. Ey and Cupit (2011) found that children are able to recognize some dangers online but often put themselves at risk and demonstrate a level of trust that could lead to a hazard. Tablets are personal devices being used in an educational capacity, so students may feel tempted to use them for personal tasks. Traxler (2010) emphasizes the challenge with digital safety stating, "e-safety becomes more problematic when on the one hand we encourage the use of student devices for learning but on the other hand have no ability or authority to control how, when or where they are used…" (p. 157-158).

Resistance to change. Implementation of a new technology can make it challenging to see the potential benefits because of what it takes to be put into place. Putting a piece of technology into action creates change. As Laferrière, Hamel, and Searson (2013) say, "When they introduce new technology for reaching new goals, IT early adopters often challenge the course of their community's normal activity: thus, opportunities and tensions arise" (p. 464). Implementations mean additional work that are outside normal operating procedures and come with a potentially negative reception. Districts will need to consider what to do if some of its employees are technology resistant and how they will help them to change. In a study regarding

preservice teachers and their intent to use technology, Teo (2012) found that, “personal beliefs were instrumental to teachers’ intention to use technology” (p. 14). If a tremendous amount of resources are being committed to obtaining and utilizing tablets, it is all a waste if they simply remain in a cabinet in the classroom. It is not uncommon for students to know just as much if not more than their teachers when it comes to technology. How will districts educate their teachers and prepare them for the transition into a predominantly digital classroom? Berrett, Murphy, and Sullivan (2012) state, “Technology integration in schools has been around for decades and so is the seemingly automatic resistance to it in the educational system” (p. 215). Resistance to change is not something to overlook or take lightly.

Professional training. Transitioning into a digital classroom will also mean a tremendous amount of training before, during, and after the transition.

Galligan, Loch, McDonald, & Taylor 2010 note:

> Teachers at all levels of education are exploring ways to use technology to engage their students. In some instances it can be a simple adjustment however, in many cases it will necessitate professional development in pedagogical use of these new technologies. (p. 50)

If technology consistently changes, then there are always new things to learn to stay up to date on how to use tablets as effectively as possible. Gillard, Bailey, and Nolan, (2008) state that “Innovations in the field of information technology (IT) continue to increase at an ever spiraling rate; advances in operating systems, software, communication devices and methodologies are renovating the inventory of IT products on a near daily basis” (p. 22). There will need to be

considerations for what kind of a foundation users will need for understanding the basic functionality of a tablet as well as ongoing opportunities to explore the nuances of tablet use. Professional development will be a necessity in order to maximize the utility of technology devices used in the classroom.

Time usage. Putting new technologies into place requires some sort of training which takes time. According to a study by Gray, Thomas, and Lewis (2010) on technology use in public schools less than half of the respondents listed instructional time spent using technology as sometimes or often but rather upwards of ninety percent listed use of entering or viewing grades and attendance with technology as sometimes or often. Kopcha (2012) found that teachers tended to have a negative perception towards technology from a time usage perspective due to the fact that "integrating technology requires planning, teaching, and classroom management practices that are new to many teachers and demands attention that is not normally spent in those areas" (p. 1118). Since time is a zero sum game, the amount spent learning new technologies must come from another activity that would normally be performed.

Purpose. A final challenge to consider is the purpose behind the use of technology; is it for a specific goal or is it to keep up with everyone else? Means (1994) states, "History suggests that whenever a new technology is introduced, be it a printing press or a horseless carriage, individuals' first inclination is to use it as they used the traditional technology it replaces" (p. 3). What is the purpose of a computer if its only tangible result is the replacement of the typing functionality of a typewriter? Technology is a status symbol that can easily be obtained for show. There is a temptation to get a shiny new gadget because that is what other districts are doing but

is it right for every district? Gillard et al. (2008) describe the desire of IT innovators getting the latest and greatest technology as being out in front and demonstrating leadership. Innovators have a desire to grow their staff and students and teach them about what technology can do.

Theoretical Framework

In order to explore tablet implementations to determine classroom-level changes, facilitators, hindrances, and perceptions, I draw on work of Berrett et al. (2012) and Levin and Schrum (2013). Berrett et al. (2012) used case study methods focused on several middle schools in a California school district. Administrators were interviewed with the intention of learning about perceptions, roles, and goals if enhancing education through technology. Levin and Schrum (2013) performed a cross-case analysis of secondary schools known for dramatic transformations involving technology. The leaders in these schools were interviewed with the goal of finding any common patterns, themes, or lessons learned.

My framework draws elements from the work of Berrett et al. (2012) and Levin and Schrum (2013) centering around the qualities of successful technology leadership and is composed of four main elements: vision, communication, modeling, and support. The combination of these four elements will be used as a lens for addressing the guiding questions for this study:

1. What changes did leaders hope to catalyze through the use of tablets?
2. To what extent were stated goals for the initiative realized in practice, and what factors facilitated or hindered the realization of these goals?
3. How do teachers perceive the implementation of tablets?

I see these components as an integral part of technology integration. Each one reinforces the others and helps to ensure a strong foundation for leadership before, during, and after implementation. Figure 1 shows my framework visually.

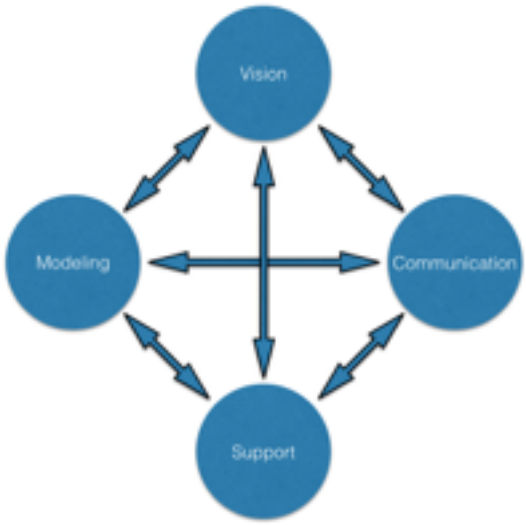

Figure 1. Theoretical Framework. This figure illustrates the way all four elements of the framework interact with one another.

Vision. Vision is a critical component to the success of a technology implementation (Berrett et al., 2012; Byrom & Bingham, 2001; Ertmer & Ottenbreit-Leftwich, 2010; Levin & Schrum, 2013). A vision is important because it is one of the first things stakeholders should hear and it sets the stage for everything that follows. Berrett et al. (2012) describe the importance of not only setting vision to inspire but to define why technology integration is occurring. Ultimately the technology change should lead to or reinforce best practice in teaching. This vision creates a purpose, giving stakeholders something to get behind and giving the project a purposeful foundation.

A vision for technology should also incorporate a plan describing how implementation will make things better in the school or district (Levin & Schrum, 2013). Members of an

organization need a road map to follow or sign posts that give an indication of the major pieces of the initiative. The better informed the people are, the more the vision will spread. A proper vision gives evidence and understanding of where an organization has been, where it currently is, and where it is headed.

Communication. Closely related to vision is the issue of broadcasting the message. Leaders must communicate with stakeholders and share the message of the technology change (Berrett et al., 2012; Levin & Schrum, 2013). There will be a message and it will come from somewhere so the leader(s) must make sure that the message comes from them. Conveyance of the vision is just as important as the vision itself and if not communicated clearly and consistently, the implementation can start off going down the wrong path.

Leadership must maintain a clear line of communication through both the messages sent out as well as listening to stakeholders. The act of communication is a back and forth dialogue or a two way street. School and district level leadership must not only transmit their views but in turn must listen to what others have to say and respond accordingly. Any initiative is doomed to failure if it is forced unilaterally with little or no input from those who must carry it out.

Communication should include the purpose behind the implementation, expectations, and honesty throughout the process. This requires a level of risk and vulnerability on the part of the leader and they are likely to get push back. Good communication up front can hopefully cut off potential hazards before they get large enough to be destructive.

Modeling. A natural way to reinforce communication is to model the expectation. Individuals in leadership positions need to model the expected change and technology use that is implemented (Anderson & Dexter, 2005; Berrett et al., 2012; Byrom & Bingham, 2001 Levin &

Schrum, 2013). Modeling will include leading by example through exemplifying the kind of attitude that accepts technology change and is eager to learn. A leader who says he or she wants to see something yet is unwilling or unable to produce the action themselves is sending a bad message.

Principals need to use technology consistently and actively participate in the creation and enhancement of technology policy throughout the change and beyond (Anderson & Dexter, 2005). Leaders who consistently use technology in multiple aspects of their job send a strong message about their commitment to the implementation (Byrom & Bingham, 2001). It lends credibility to their communications and supports the overall vision for technology in the school.

Support. Leaders must support the implementation of technology at multiple levels (Berrett et al., 2012; Byrom & Bingham, 2001; Ertmer & Ottenbreit-Leftwich, 2010; Levin & Schrum, 2013; Teo, 2012). Supporting a technology initiative further extends modeling by setting the example through determining priorities and allocating resources accordingly. The resources and assistance sends the message that it the initiative is important which also aligns with the vision.

Resources should be made available for teachers so they can have the tangible assets necessary to do their job. Teachers also need access to technology specialists and training to maximize the utility of new technologies in their classroom (Berrett et al., 2012). Instructional support for incorporating technology into lessons will go a long way and should help to maintain teaching best practices. Along with instructional support, teachers should be provided with technical support to ensure the majority of the time a teacher us instructing rather than trouble shooting technology (Levin & Schrum, 2013). In addition, administrators need to support staff

by encouraging trial and error and understanding failure is part of the process. A technology change will likely come with some bumps, but those bumps are opportunities to learn and improve.

I see vision, communication, modeling, and support as four pillars of a successful tablet implementation. In order for a leader to create a smooth technology transition, each of these must occur at the classroom level. There is a back and forth, give and take relationship at work between administrators and teachers that should be evident when looking for these elements.

Chapter Three: Methods

Research Design

According to Merriam (2009), “In its broadest sense, research is a systematic process by which we know more about something than we did before engaging in the process” (p. 4). I wanted to know more about the changes that occurred from a tablet implementation in a school. To better understand my research questions, I executed a qualitative research study.

Qualitative

My research questions were aimed at the goals of leadership, instances that helped or impeded those goals, and perceptions about classroom change; therefore, exploring the experiences and perceptions of the individuals involved well-informed those questions. I was interested in the interactions that occurred between leaders and classroom teachers as tablets were implemented and how they each viewed the subsequent changes. These experiences and interactions were captured and triangulated through a survey, interviews, focus groups, and observations in an effort to “gain a deeper and clearer understanding of the setting and people being studied” (Taylor & Bogdan, 1998, p. 80).

Case Study

Case study is an appropriate approach when seeking to learn about the experiences of others specific to a phenomenon (Yin, 2009). A tablet implementation is a real life phenomenon that can be learned about through the experiences of others in an environment where variables do not have to be controlled (Yin, 2009). I utilized a case study with the intention of getting a “rich description" (Merriam, 2009, p. 16) from three schools that have been through a tablet

implementation. What was the implementation like at each campus and what were the similarities and differences for these three campuses? My expectation was to get a deep understanding of the experiences of individuals within specific schools in order to determine if any patterns or themes emerge that could be useful considerations for future leaders looking to implement tablets in their schools.

Benefits. There are some real advantages to utilizing a case study to answer my questions. Each of these benefits is likely to have a possible drawback depending on the way they are viewed (Merriam, 2009). My study did not require the manipulation of multiple behaviors and variables (Yin, 2009). Instead I was able to observe what was currently happening as well as interview individuals to get an idea of the history of what did happen. My focus was therefore on observation and note taking rather than controlling for and setting up an experimental situation (Merriam, 2009).

Observing students and teachers in classrooms enabled my research to be "anchored in real-life situations" (Merriam, 2009, p. 51). Observations were based on what was really happening and not altered by setting up specific circumstances. I wanted to observe the natural state of tablet usage in the classroom.

Since the context of my study was not limited to a specific instance that had to be carefully controlled for but rather a view of themes and patterns that emerged from observation then the reader of my research can determine how to apply my findings. Readers, knowing their own situation, will be able to determine if there are any observations I found that might be useful to their setting and context.

Rich description. In my study, I dug down into the facilitators and hindrances at the classroom level. I wanted to understand the types of factors that influenced and whether or not they were internal, external, or a combination of the two. Pictures (e.g., classroom layout, charts) and text were used to describe the context using field notes, observations, quotes, and interviews (Merriam, 2009). Classroom instructors play a key role in the educational process so their perceptions of tablet use in the classroom were also of interest. Descriptions given by teachers who had been in the classroom with the technology would tell a much richer story than relying solely on survey results.

Bounded. My case study involved schools in a single public school district within the Dallas/Fort Worth metroplex. This geographic restriction allowed for ease of access as well as in-depth data collection within a realistic timeframe. Researching a tablet implementation in a bounded system allowed for a better level of focus placed on individuals who had direct experience with the change.

Table 1

Survey Respondents

	Surveys Issued	Surveys Returned
Intermediate School	50	14
Middle School	75	17
High School	125	19
Total	250	50
Response Rate		20%

Individual sites. The study involved three different campuses, each with their own experience, however the schools were a part of the same feeder system. Data collection occurred at one intermediate, middle, and high school. Examining schools in the same feeder system gave

a sense of linearity and a view of where various grade levels fell on the same spectrum. More sites would offer a larger variety of information and a more compelling interpretation (Merriam, 2009). Each of these sites were different due to age and content taught, but still encompassed the experience of a tablet implementation. I hoped to see if participation in the tablet implementation was similar for teachers and leaders at each grade level or if there were discrepancies.

Within-case analysis. Initially, each school was examined as its own standalone entity to reveal the experiences of individuals involved during and after a tablet implementation on each individual campus. A within-case analysis would give insight into the exposure teachers and leaders had within the context of their respective location. Each campus would be treated as a separate case with the aim of understanding as much as possible about their specific situation.

Table 2

Interview Respondents	Interviews Completed
Administrator	5
Teacher	12
Total	17

Cross-case analysis. After completion of the within-case analysis, a cross-case analysis would be created in an effort to evaluate similarities and differences across the three campuses. The experiences specific to each campus could then be examined against one another to look for patterns or themes that might give answers to my research questions or possibly give rise to new questions for further study.

Procedures

Participants

District. For my study, I visited schools in the McAlister[1] Independent School District located just south of Fort Worth, Texas. The district recently incorporated tablets into classrooms at all levels. McAlister ISD was small enough to be easy to work with yet large enough to have a variety of possible campuses to participate. Taylor and Bogdan (1998) believe, "The ideal research setting is one in which the observer obtains easy access, establishes immediate rapport with informants, and gather data directly related to the research interests" (p. 27). I believed McAlister ISD would most closely allow me to reach these goals. Access was eased by prior communication with the district administrator tasked with technology implementation, and the response had been positive thus far.

Site selection. This study required an intermediate, middle, and high school campus within the same feeder system. Each campus had to be selected from among district campuses after consulting district leaders and speaking with principals at potential study sites. These campuses needed to have core classes with regular access, at least on a weekly basis, to tablets for classroom use. For the purposes of this study core classes were considered any course falling under english language arts, math, science, or social studies. Schools were not selected specifically based on student demographic data or standardized test scores.

Individual participants. All teachers and school leaders from each of the three campuses were included in the survey that was sent out. Including all teachers and school leaders on each campus as potential respondents allowed for the most data to be collected from the largest amount of participants in the shortest amount of time with the least amount of effort. Participants who were not a part of the interview or observation process would still be able to

[1] Pseudonym

give input through a survey. Altogether two hundred fifty individuals received a survey and fifty chose to return it resulting in a 20 percent response rate. Table 1 displays the number of surveys issued and returned for the study.

For the interview portion of the study, four individuals were selected from each campus based on the criteria that they taught a core subject area and students in their classes had regular access to tablets for instructional purposes. The four individuals interviewed each taught a core subject in a different classroom. These teachers were selected because core classes are highly likely to be a part of any public school curriculum therefore studying them may prove more enlightening. Their students had to have the ability to use tablets regularly in order to study whether or not tablet use was occurring and any subsequent behaviors that surrounded their use or non-use. Educators were not selected for interview based on any specific way(s) they were utilizing tablet technology in their classroom. The principal and an assistant principal from each campus were also invited to interview as well as the district technology coordinator. Table 2 displays the number of individuals asked to participate in an interview and the number who actually completed an interview. Five administrators and twelve teachers participated for a total of seventeen interviews.

The selection process for observations was essentially the same steps and criteria as that of the teachers selected for an interview. Three classrooms were observed at each campus. Classroom observations were driven by school schedule as well as the principal's decision on which rooms he or she would permit me to visit. The primary concern of observations was on rooms where core curriculum were taught and an entire class period or lesson could be viewed.

A focus group composed of three to five students was also conducted at the intermediate and high school campuses. The focus group at the intermediate campus targeted fourth and fifth grade students and was made up of five participants while the high school focus group targeted tenth, eleventh, and twelfth grade students and consisted of three participants. The principal was asked to select students for the the focus group at each individual campus. Both principals deferred the decision for focus group selection to a campus staff member who consistently worked with technology.

Demographics. During the course of my surveys, interviews, focus groups, and observations there were seventy-eight pieces of data media collected (fifty surveys, seventeen interviews, two focus groups, and nine observations). The ratio of males to females was about forty percent to sixty percent. Of those that identified ethnicity, eighty-nine percent were White, seven percent were Black or African American, and four percent selected other. Thirty-five percent of the teachers that participated were science teachers, thirty percent were math teachers, about twenty percent were English language arts teachers, and about fifteen percent taught social studies. About seventy-five percent of those who elected to share their number of years in education were between zero and fifteen years of experience. Sixty percent of them had been on their particular campus for five or less years. Another quarter of participants had been on their campus between six and ten years. Fifteen percent of respondents were between the ages of eighteen and twenty-nine, sixty-five percent were between thirty and forty-nine, and twenty percent were fifty to sixty-four.

Study context. McAlister Independent School District is a suburban district located in northeast Tarrant County. The district is comprised of ten one elementary, four intermediate,

three middle, two ninth grade, and two high school campuses. McAlister ISD serves just over 15,000 students broken down by the following ethnicities: 41% African American, 30% Hispanic, 21% white, 4% Asian, 1% American Indian, and 3% multi-race. Just over 60% 0f students are economically disadvantaged.

Data Collection

Collection plan. I collected data in four different ways in order to understand the experience of a tablet implementation and get a clearer sense of any possible patterns or themes using multiple perspectives. The process of data collection started broadly and was less context specific and moved towards a narrower view of the participants in the tablet implementation. The goal was to see if any of the experiences of participants aligned or varied significantly across surveys, interviews, focus groups, and/or observations.

Survey. Data collection using the survey component was the broadest source of data collected and targeted the largest group of participants. Prior to sending the survey, a recruitment letter for employees (Appendix D) was sent out to the district emails of all three campus staffs. The survey (see Appendix F) was sent to the faculty and leadership of the selected intermediate, middle, and high schools to complete via the online survey platform Qualtrics. Included with the survey, I attached the consent form (Appendix A) to the email that invited them to complete the survey (for information purposes only) but that completion of the survey (since it was electronic) was considered evidence of consent. Three to five days prior to sending out the survey, a short email was sent to principals and their assistants to forward to their staff so they could know to expect the survey within the week. The survey was delivered during the first week of November to give educators time to get the school year started. The online survey window sent out a

reminder twice, one week following initial delivery and again the second week after initial delivery. After four weeks the survey was closed for examination of results.

The survey process was simple to follow and quick to distribute in order to maximize potential responses. The survey took approximately ten minutes with the goal of capturing a snapshot of the tablet initiative as well as its effects in the classroom. The survey included questions such as what where you told to accomplish with tablets in your classroom and what factors facilitated reaching those accomplishments? The aim of these questions along with the rest of the survey was to have the participant paint a picture of whether or not they were told to use tablets, any expectations that came along with the implementation, and what types of results they are seeing. Each survey reflected an experience(s) from the classroom teacher's perspective.

A limited amount of quantitative data was collected in the survey. Participant demographics as well as role on the campus were collected. Each participant indicated the level of campus they worked at, the number of years there, and the number of years there had been in education.

Interviews. The survey process was followed by seventeen face-to-face interviews, four from each of the three campuses, one from the principal at each campus, one from an assistant principal, and one from the district technology coordinator. Prior to each interview, I reviewed the consent document with each participant. A signed copy was filed for the investigator's records and participants were given a copy to retain for their records. Interviews were recorded using the investigator's phone and then transferred to a secure computer file within twenty-four hours of the interview. The interview process was consistent, utilized the same set of questions for each participant, and was capped at forty-five minutes. Stratified random sampling was

utilized to select one teacher from each of the four core subject matter areas at each campus. Each teacher in a core subject was assigned a number. One number from each subject was drawn to determine interviewees. At each campus there was one or more teachers who were unable or unwilling to participate in an interview. In each situation another teacher was drawn at random until someone was willing to participate.

I wanted to reach participants at a convenient time and location so they could be comfortable and not feel rushed with their responses. I used a semistructured interview approach (See Appendix G). Protocol questions guided the conversation through the issues of expected changes before implementation, realized goals, facilitators and hindrances, and ended with teacher perceptions of changed classroom practice. I used some structured questions as well as some open ended questions. I primarily asked experience and behavior questions, opinion and value questions, and perspective-based feeling questions in order to get participants to open up. Questions were targeted specifically and focused on one topic per question with room for probes as necessary. Interview questions included the following: tell me about your classroom before you had tablets, why did your school implement tablets—what were teachers told about the rationale for the program, and how do you see your classroom changing because of tablets? The purpose of the questions was to learn about the interviewee's experience before and after tablets within the context of what their leadership expected them to do.

Observations. I utilized an observer as participant approach where my primary focus was on observing (Merriam, 2009). With this approach, participants knew about my activities and revealed what they chose; I also participated but participation was secondary to the collection of information (Merriam, 2009). Observational data was collected by hand and

transferred to a digital format on my laptop. I initially started somewhere in the room where I could get a quick sketch of the layout and from there moved around the room depending on the activity. Observations were conducted in a manner as unobtrusive as possible.

Prior to each observation, I reviewed the consent document with each participant. A signed copy was filed for the investigator's records and participants were able to retain a copy for their records. The observation process took place onsite at each school and was as similar as possible for each campus and classroom. If a class deviated from their assigned classroom for whatever reason then the observation looked somewhat different than the rest. For example, one teacher took their class to a lab to conduct a science experiment as a part of their lesson.

For the observations I collected a number of types of information (see Appendix I). The physical setting and layout were noted as a rough sketch indicating where students and teachers were located along with their desks. Attention was drawn to where things were in relation to the board, the door, the windows, as well as supplies. Traffic patterns, centers, tables, or other special equipment in the room was also be of interest. Every ten minutes during an observation the number of students using tablets was tallied. Along with the tablet tally, cell phones in use were also tallied.

Information came from myself as the observer but was based on the students in the room. I was looking for the number of students in the classroom as well as what their activities and interactions were like including conversations and moments of silence. Attention was drawn to subtle factors that may or may not occur such as sudden changes in activities or body language. My own comments were made as observer comments based on what I saw happening.

Focus group. Participants for each focus group were selected by the principal or an assistant principal at each campus. Prior to each focus group, a recruitment letter (Appendix E) was sent home for parents to view along with a parent permission form (Appendix B), and a form for student assent (Appendix C). I reviewed the consent document with the participants. Signed copies were filed for the investigator's records and participants were able to retain a copy for their records. Focus groups were recorded using the investigator's phone and then transferred to a secure computer file within twenty-four hours. Sessions did exceed forty five minutes. The focus group was driven by the questions in the focus group protocol (Appendix H). Questions for the groups centered around what a typical day was like in the classroom with regard to tablet use. Students were asked about how tablets were used as well as how often they were used. All participants were given pseudonyms in order to protect their identity.

Participants had the opportunity to withdraw from any part of the study at any time. If they choose to exercise that option all hard copy data would have been shredded and any digital data would have been deleted. Consent documents would be retained and the notice of withdrawal from the study would be attached.

Data Analysis

I laid out all of my data based on data type (survey, interview, observation, focus group) and got a general overview of everything I collected. I then began a process of reading and sorting the data in several steps until I had a coherent set of understandable information to address my research questions. All interviews and focus groups were transcribed to separate Word documents. The overall process looked like a pyramid in that I started broadly at the base and slowly sorted everything until I had small, more manageable groups of data that were highly

focused (Merriam, 2009). The analysis process was done first by examining the within-case information for each campus individually and followed up by a cross-case examination of the data.

Within-case. To start the within-case analysis of data I created a user account for Dedoose, a web-based application for analyzing qualitative research. Once an account was setup descriptors were created and set fields were used to label the information that would be imported to my account. The fields included were name, role, grade level, subject, participation type, years of experience, years at current campus, ethnicity, gender, and age. Participants across all formats, survey, interview, focus group, and observation, were then listed in a spreadsheet file with as much field data as I had on them filled in. This file was then uploaded to my Dedoose account to match up with the set fields I had previously created. Once both files were uploaded each individual had a set of descriptors tied to them so I could associate or link them to one or more media files. After this, all survey responses, interview and focus group transcriptions, and observation notes were put into a Word format and uploaded as individual media files. Once complete I opened each media file, for example an interview transcript, and associated it with a descriptor. In each case the descriptor was a specific participant. This would allow me to filter based on all of my set fields so I could look at specific data subsets.

To begin the coding process I created a list of codes in my Dedoose account beginning with communication, vision, modeling, and support. Then I started reading each set of survey responses highlighting sections, sentences, or phrases with key words or concepts that were viewed through my theoretical framework lens (Merriam, 2009). Other key terms began to develop out of the data based on frequency so I started adding them to my code list such as

access, engagement, inability to articulate, misuse, professional development, etc. During this process I would pause and ask questions that come to mind as I combed through surveys, interview and focus group transcriptions, and observation notes (Merriam, 2009). Before and during the coding process I read and reread my data over and over ensuring I got a firm understanding of what was there (Taylor & Bogdan, 1998).

Once coding of the survey data was complete, the intermediate campus interviews were coded. Once the interviews and focus groups had been transcribed, they underwent the same process as the surveys but this data was associated to interviews and focus groups at the intermediate campus. While searching for key words and making notes, I continued to highlight and code them using my list of codes. If new codes were needed based on what I was reading, I added them as appropriate.

After coding was completed for the interviews and focus groups, the observations were coded. Any hand written observation notes were recreated digitally in a word processing document and then the process was the same as with previous collected data. Phrases and sections of observation notes were associated with intermediate campus observations and coded according to where they fit. Throughout the process of coding as I added codes, I went back through previously coded data to see if newer codes applied.

The coding process for the intermediate campus was replicated for middle and high school campuses. Each piece of media was associated with the appropriate individual and coded using the previously created codes. Again codes were added as needed and I made a final sweep through the data to ensure codes were added everywhere they belonged.

Categorizing. Once coding was complete, I moved towards categorizing everything I had coded. All codes were downloaded so I could manipulate them and put them side by side. I attempted to start making categories out of the codes that seemed to go together (Merriam, 2009). Specifically, I looked for words and phrases that could go together and found a lot of shifting around and playing with possibilities (Taylor & Bogdan, 1998). This process involved asking questions to myself to help form categories (Taylor & Bogdan, 1998). Categories involved change goals from leadership, communication of goals, actual tablet use, aspects that helped or prevented tablet use, and perceptions about tablet use. I looked for codes that were similar which lead to combining some and others were not close enough to combine but seemed to complement one another. I also looked for codes that seemed to fit into more than one category and would add them as necessary.

Bucketing. Once I had a rough category for all my data, I reread everything examining all categories and begin to write out some patterns that were emerging (Merriam, 2009). I looked for patterns viewed through the lens of vision, communication, modeling, and support. Patterns regarding what was desired, why it was desired, and if tablet use was happening were examined using vision as a bucket. Terms and concepts based on clarity of message, common understanding of vocabulary, and teacher attitudes were used for communication. Modeling was bucketed by looking at how tablets were used and benefits of using tablets. Support factors were bucketed by looking at the challenges and needs associated with tablet use. This process helped me to get a sense of whether or not the data were in the right place. The patterns that I wrote out were sorted into buckets according to my research questions. I displayed my patterns and buckets in a chart in order to get a visual picture of whether or not my buckets made sense (Merriam,

2009). All of the patterns that dealt with leadership desired goals went into one bucket, another bucket contained anything related to supporting factors or obstacles as well as how well goals were met, and the final bucket contained patterns pertaining to the views of teachers regarding tablets in the classroom and/or potential changes they saw. Throughout this process, I had my purpose statement written out as a constant check of whether or not my buckets addressed my research questions (Merriam, 2009).

Consolidation. Once all the frequently occurring patterns were properly put into a bucket that was geared towards one of my research questions, I consolidated the buckets. During this consolidation process I tried to link the categories within my buckets in a way that made sense (Merriam, 2009). Each bucket ended up with concepts made of patterns that fit together and made sense all while addressing aspects of my research questions in some way. When I finished, I attempted to create a simple outline and visual model that would illustrate the connections of my concepts to ensure my consolidated buckets worked well together (Merriam, 2009).

Cross-case. Qualitative data from each of the three campuses were then compared against each other. Consolidated buckets and themes were examined to determine if there were any similarities or differences. Anything that stood out was noted whether it was a similar occurrence or an isolated one.

Limitations

My case study also included some drawbacks as no research methodology can be all things for all purposes. I attempted to understand and be mindful of any drawbacks that come up for consideration in my analysis.

Generalizability. I planned to examine an isolated group of individuals at multiple sites which would not be scientifically generalizable (Yin, 2009). Variables on the campuses where my research took place were not tightly constrained therefore my findings are not predictive in nature (Merriam, 2009). I was able to describe what was there rather than extrapolate what was likely to occur next. Although not predictive, my findings are still able to apply in some form for others in a similar situation. My research can at least give leaders of schools in similar districts an idea of what they might encounter or expect if pursuing a tablet implementation of their own.

Participation for all parts of my research was completely voluntary. A total of fifty individuals participated in surveys between the three campuses. This is not enough to generalize, but when combined with interviews, observations, and focus groups it does help to get a somewhat of a picture of what has happened in the district. Similarly, one of the three campuses did not have any students volunteer for the focus group. Based on the limited time and scope of the research, two focus groups was better than none and was an additional contribution to the data.

Rigor. This study could potentially become biased if I was not careful to use a systematic process (Yin, 2009). Even though I was not manipulating variables and behaviors to isolate situations for study, I still had to use systematic procedures for observation and data collection. Given the narrative fashion of qualitative research, if not careful I could easily have incorporated bias into observations and descriptions without realizing it (Yin, 2009). Since case studies involve understanding part of the issues before field work begins, a systematic process of observation and note-taking would help mitigate the chance of the investigator attempting to confirm a preconceived notion (Merrian, 2009).

Management. Merriam (2009) notes that multi-site cases can be difficult to manage. There were more rooms, names, situations, and locations leading to potential mix ups that could have occurred during the field work. There were multiple issues to consider during the field work portion of the research and Yin (2009) notes, "we have little way of screening for an investigator's ability to do good case studies" (p. 16). There was not a clear demarkation of what exactly was expected when compared to a quantitative study.

Reliability and Validity

Credibility. There were a couple of ways I strived to ensure validity or credibility. The first was through the use of triangulation. Utilizing data from surveys, interviews, focus groups, and observations allowed information from one source to be checked against information from the other sources (Merriam, 2009). This helped to ensure that what was seen lined up with what was described in an interview or survey response and vice versa. A second opportunity to create credibility was in the form of member checks. Feedback was solicited from interviewees in an effort to ensure smooth, clear communication had occurred and there were no misrepresentations (Merriam, 2009).

Reliability. In order to ensure reliability or consistency, I engaged in the use of summary memos. During the process of data collection and analysis, I recorded a bi-weekly summary memo of what I had seen, any thoughts, experiences that stood out, questions, and a general summary of findings at that point. These memos helped to mitigate a biased view of what was seen and described and helped ensure that experiences and information from one place did not bleed over into another.

Chapter Four: Findings

In all, I spent seven weeks in a north Texas district collecting data from an intermediate, middle, and high school in an effort to learn more about a tablet implementation. Specifically, my efforts aimed at understanding:

- What changes did leaders hope to catalyze through the use of tablets?
- To what extent were stated goals for the initiative realized in practice, and what factors facilitated or hindered the realization of these goals?
- How did teachers perceive the implementation of tablets?

Analysis of data through the lens provided by the theoretical framework yielded several insights pertinent to these questions. In what follows, I present these findings, first specific to each case, and then with respect to findings across cases.

Within-Case Findings

Within-case findings are organized first by campus, then research question, and finally by emerging theme. Some questions had more emerging themes than others and certain themes span across multiple questions.

Intermediate School

The intermediate campus had not been able to participate in the tablet initiative in a true one-to-one fashion. The campus was utilizing a cart system consisting of four carts containing varying amounts (about twenty to thirty) of tablets for classroom use. Carts had to be reserved ahead of time for a minimum of one day and up to a maximum of five consecutive days in a week. Students did not own, rent, or borrow the tablets for extended periods of time; they

operated under similar use as a computer lab and therefore tablets remained on the campus at all times. At this point in time the one-to-one initiative is only occurring at secondary campuses.

What changes did leaders hope to catalyze through the use of tablets? Interview data revealed a number of common changes leaders hoped to see as a result of the tablet implementation. Access to technology and engagement in classroom lessons were the primary changes that came from the intermediate campus data but there were also several responses indicating an inability to articulate what was to be accomplished with the tablets.

Access to technology. One of the themes from the intermediate campus was the desire for students to gain access to technology through tablets. Campus access was generally expressed as a desire to have students exposed to technology and interacting with tablets. Exposure to tablet technology was through a cart system which meant four carts were shared among all classes. During an interview, one teacher expressed how a class can access technology by using a cart of tablets and get "that tablet in their (student) hands." Another interviewee said teachers "were strongly encouraged to use as much technology as we can" and another talked about increasing the availability and amount of technology students could access. One of the campus administrators said they connected with the district technology office in order to facilitate a tablet cart system for the campus. These conversations lead to the intermediate campus growing from initially having one cart to four. Survey responses indicated a desire to get tablets into the hands of students and one commented teachers were "encouraged to find ways to make them a part of our class." Six individuals from the survey shared the desire to get technology into the hands of

students. There were also several mentions of trips to the computer lab as the primary means of accessing technology before tablet carts were made available on the campus.

Engagement/Interest. A second pattern that emerged with regard to the changes leaders hoped to see was a deeper level of engagement and interest in academic subject matters. One of the classrooms before the implementation of tablets was described as, "Kids finishing and not having anything to do that they were interested in doing. You know I'd have other activities for them to do but then they would do it but it wasn't engaging to them." Teachers understood leaders as having a goal of engaging students at multiple levels and wanting to move away from worksheet types of activities. This change was also described as wanting to see "more authentic things, you know, where they can actually create something that's more meaningful" and having opportunities for students to "take more ownership." Between interviews and surveys, ten different individuals simply asserted that tablets help students to be more engaged because they are "fun," "motivating," and "exciting." During observations, students using tablets were typically on task and completing their assignments. In a math class one student got off task briefly in the last ten minutes, in a science class two students played around with their tablet cases for a few minutes, and in the third class five students starting talking about the weekend during the last five minutes of class. Altogether eight out of fifty one students using tablets got off task for five minutes or less.

Inability to articulate. A final pattern with regard to the changes that leaders hoped to catalyze through this tablet implementation was an inability to articulate among some respondents about what teachers and students were specifically supposed to do with the tablets.

When asked, through survey or interview, to describe the goals for the implementation teachers responded:

- I don't remember any written goals.
- We haven't really been given expectations of what to do with them or how to use them just however we want to use them.
- I don't remember any being given (goals).
- We weren't really given many guidelines or rules on it.

The recurring answer was that teachers were able to use tablets the way they saw fit. Responses from interviews and surveys indicated a level of uncertainty from some of the staff about the changes they were to undertake in the classroom. One respondent said, "our school has no stated objective (that I know of)." Another said no goals had been set and three more indicated that no changes or goals were explicitly stated to them.

To what extent were stated goals for the initiative realized in practice, and what factors facilitated or hindered the realization of these goals? Data revealed a general feeling that goals for the initiative were not being met or that there was a lack of growth toward reaching goals. Respondents saw tablets as an opportunity for students to be self-directed which was viewed as beneficial but uneven access to tablets and troubleshooting issues were common themes hindering growth.

Lack of growth toward goals. An inability to articulate when it comes to changes leadership hoped to see ties into the perception that goals for the initiative are not being met. Every single teacher at the intermediate campus that was either interviewed or responded to the

survey reported there were no goals for the initiative, the goals were not being met, or if there was a goal it was not communicated to them. A few individuals made positive remarks about growth towards goals; one teacher said, "I feel like the district is making progress but it seems like there is much more distance to be worked through to get to their goals." Another said, "I think they're working on it." At this particular intermediate school it seemed that goals were not being realized either because they were not written in a public forum or because goals were not communicated clearly at the onset of the implementation.

Self-direction. Data revealed self-direction as a positive facilitator for reaching district goals. Think Through Math is a website that teachers referenced and used where students could login and follow a set of lessons that track progress, assess learning, provide tutorials, and then allow students to move at their own pace. Several teachers described their students using the program between lessons and activities as a way to improve their skills. One teacher noted the usefulness of Think Through Math for response to intervention and for struggling students. During the campus focus group, one of the students noted using the program frequently. This was also observed in math classes; when students would finish their assignments, they logged on to Think Through Math and would continue where they left off on a set of skills determined by the program. Students accumulated points for their progress which would then be sent by email to the teacher. Teachers could also login to check the status of each student in their class. In each classroom that I observed, there was some component of tablet work, for students that had them, involving a level of self directed activity.

Uneven access. Some patterns revealed areas of potential hindrance for reaching district goals. One of these was a concern that not every student in the school had a tablet. When

referring to using the tablets from the cart, one of the students from the focus group said, “There are never enough for the whole class.” Two of the three classroom observations revealed that each cart had enough tablets for all students; however, several were broken so some students had to share or go without. If there were four carts on a campus of at least sixteen core classrooms, it was not possible for every student to have a tablet in their hands at the same time.

Troubleshooting issues. Another hindrance that emerged was the challenge of troubleshooting issues. One of the teachers shared, “I think the factor that hinders me the most is my limited knowledge in how to fix tech problems that sometimes arise with the tablets. I am still learning.” Troubleshooting can take a range of forms whether it is charging and turning a device on or gaining access to the internet; both were challenges brought up by students and teachers alike. In all three classroom observations I witnessed teachers having to reset tablets and try to fix other student issues. One of the most common challenges was trying to get students logged into various websites or programs. Two students spent twenty minutes of their class period attempting to login to an app on their device because they would not ask for help. One teacher spent fifteen minutes troubleshooting for a line of twelve students. In each situation either the student(s) were not able to work on their assignment or the teacher was not able to teach until the technology issue was resolved.

How did teachers perceive the implementation of tablets? Teacher perceptions varied but some common themes emerged related to moving towards a digital classroom, training, and what the future of education looks like.

Going digital. The opportunity to replace books and use less paper came up multiple times across interviews. Several teachers commented that the district was moving towards an online format for curriculum and that all textbooks would eventually be online. One teacher went so far as to say having a tablet "gives them an unlimited amount of information, which results in knowledge gained that a textbook might not offer." Teachers used phrases like "going all digital," "textbook curriculum," and "notes online." Students in the focus group also commented that it is easier to use tablets instead of books because, "you can search for what you want and you do not have to go to the library to get a book for research." Another reason teachers cited going digital was not just moving away from paper but doing "more than just pen and paper." Teachers seemed to pair the idea of getting away from worksheets and traditional notes with using a device to drive more participation and involvement from students. During observations each classroom utilized tablets for a task that would have normally required pencil, paper, and/or books. In one classroom, a student copied information from the internet and pasted it into a document with a picture of the sun. They labeled the parts of the sun with the text found online. Students also took notes on the tablet by filling in the blanks as the teacher went through a PowerPoint presentation. In another classroom, students drew a digital picture of their research topic and then typed facts about the topic under the picture.

Professional development and training. Data pointed towards some form of professional development or training in the area of incorporating technology into the classroom as important to teachers. This was identified as important by one teacher who said, "Every time we get a little bit of workshop and training that helps give me more confidence and then I come back and try

something so the training is a big deal." Several comments were made about the desire for more training because teachers want to get better and understand the best way to incorporate tablets into their lessons; one teacher used the phrase "improve my working knowledge." Another teacher specifically referenced the constant connections student have through technology devices and the importance of understanding how those devices can be utilized for instruction. Other comments involved a desire to learn how to effectively use the tablets.

Tech savvy students. The desire for more or continued development and technology training goes hand-in-hand with the perception on the part of teachers that the students know more about technology than they do. Students as a whole were described as a "generation that is more technologically savvy" but only two teachers described themselves as feeling comfortable with technology. Other comments about the abilities of the students included:

- You know I've seen the kids they'll say, "Can I do a project on this?" It's like, ok, they can use that tablet in this room and they don't have to be out of my sight. So while I can work with the lower ones but again I'm not that proficient on or with a regular computer much less a tablet. I feel like I fumble with it.
- I got to tell ya I'm not that comfortable with the tablets.
- My kids who would do the worst on a worksheet do the best on a project using the tablets just because they can figure out how much to do and a lot of times they've figured it out before I have.

Technology is the future. A final theme that emerged from the perception of teachers was the notion that technology is the direction education is moving so teachers need to prepare their

students. The tablet implementation was viewed by one teacher as the district's attempt at "trying to keep up with the future and what's going on today" because "that's the way of the world." Others saw the implementation as a part of living in a "technological age" where "everything is technology based." Another teacher professed the need to prepare students for jobs because they will be using technology. Several responses indicated that teachers do not know exactly what the future will look like but they felt confident that moving forward education will involve a heavy dose of technology. During the focus group, one of the students commented that schools are advancing towards higher levels of technology. There was a pattern of responses about technology being the future indicating a need to prepare students now.

Middle School

The middle school campus implementation of tablets differed from the intermediate campus because they offered every student the opportunity to rent their own tablet for the year in a true one-to-one style. Students were not required to get a tablet but they had the ability to rent one from the district for the academic year. Fees varied depending on socioeconomic status and all rentals included a signed agreement from students and parents.

What changes did leaders hope to catalyze through the use of tablets? Overall the educators from the middle school campus indicated change goals of access and a deeper level of engagement in the subject matter and at the same time there was a similar amount of feedback suggesting an inability to articulate with respect to desired outcomes.

Access to the internet. Multiple individuals commented on the importance of internet access for a variety of reasons. For some internet access was about being able to use a search

engine to find content or the ability to complete homework assignments from home. If students did not have internet access at home, they could bring their tablet to a school within the district to access internet services. One individual commented on internet access as a critical component to viewing their online textbooks. Another teacher created classroom content so as long as students could get online with their tablet "there would be no excuse for them not being able to access the instructional videos at home."

Engagement. A second theme that came strictly from the survey was a goal of "student engagement." This term was repeated by twelve different individuals who also used terms such as "engaging every student" or "engaging every learner." This seemed to put an emphasis on reaching the entire classroom rather than a subset of students. Another response positioned the importance of engaging students in "today's global culture" while others described the importance of "enhancing engagement" and "active engagement." Oddly, though prominent in survey comments, no participants in interviews or focus groups mentioned student engagement in any way.

Inability to articulate. An inability to articulate tablet initiative goals came out of the survey and interview data. When asked why their campus implemented tablets, responses indicated little if any understanding of the purpose.

- I have no idea.
- So there wasn't really a lot…it was kind of fly by the seat of your pants um, it was, we were always one step behind instead of ahead.
- I never really heard anything about what we were supposed to do.

- The parameters at this point are set fairly low. It's not necessarily a district mandate that we use iPads but it's definitely strongly and highly encouraged that it's used in the classroom.
- The expectations as far as instruction with the tablets or online, it was minute, practically inexistent to be honest.

Survey responses included multiple mentions of "no clear goals" or "I don't know." There were also several individuals who stated that they were supposed to use tablets and could implement them in whatever way "they see fit." Overall the common theme was tablets need to be used but the expectation of how was left open.

To what extent were stated goals for the initiative realized in practice, and what factors facilitated or hindered the realization of these goals? The data indicated a mixed response about whether or not district goals were being achieved. Few facilitators of movement towards goals emerged, however multiple hindrances impeding goal growth surfaced from the survey, interview, and observation data.

Mixed feelings about growth towards goal. The middle school campus responses indicated an inability to articulate what goals leadership hoped to accomplish with the tablet initiative. Without clearly defined goals, it is challenging to know whether or not the purpose of the initiative is being realized. One individual commented, "I think that they've been achieved to a certain degree." This person believed the implementation to be at about "90%" but did not say if data were being tracked nor did this person reference anything specific. When asked to what extent goals had been achieved another respondent simply answered "95%" and gave no

additional information. Other responses to this question included “yes,” “students are becoming more knowledgable,” “it is taking longer than expected,” and “I know that the tablets have greatly improved the flow of learning, testing, and grading.” None of the respondents indicated that they were actively tracking data to inform their answers. There were also a number of individuals who believe goals are not being achieved. Responses included, “I don’t think they have been,” “less than 50%,” “I don’t think so,” and “I don’t really think they are being achieved.” Survey respondents backed up the lack of growth toward goals with similar comments such as “I don’t believe they’ve been reached” and when referring to what they goals were “none to my knowledge.” Whether goals were being met or not, at a minimum there did seem to be a fuzzy understanding of what goals were in place.

Uneven access. Another challenge of the initiative involved students not having a tablet or not bringing their tablet to class. One teacher elaborated, “I’ve got a class that’s got six kids out of twenty that don’t have an iPad. It makes it really had to to use it that way.” Another interviewee said, “A lot of parents won’t sign up for it [the tablet] because they think it’s going to be a distraction at home or different things like that…” During two of the interviews, participants explained that not every student had a tablet so it was difficult to create a lesson around them because the teacher has to make a digital lesson for part of the class and then prepare paper copies for the rest of the class; this increased teacher workload. Survey respondents echoed the sentiment that “they are nice” but not every student elects to receive one. There were also multiple responses about students not bringing tablets to class and how that had become a challenge that took up class time. Across the three classes that were observed, a total of sixty-one

tablets could have been utilized by students and nine were actually used. It was not possible to determine if all sixty-one students had a tablet with them and chose not to use it or if only nine students had tablets with them. Seven of them were used in one class, one in another (the student was playing football), and one in the third (the student was trying to discretely use the tablet without permission).

Misuse. The misuse and the fear of misuse of tablets was another pattern that emerged from the interviewees at the middle school campus. Trust was a factor for one teacher who believed tablets could be used effectively if students would "do what they were asked." Three teachers stated monitoring of the tablets had become a constant undertaking in their classroom. One teacher said the room has to be arranged in such a way that tablet screens can be seen by the teacher at all times. This mistrust appeared rooted in reality: In one observation, students were asked to look up answers from a textbook without the aid of tablets, but one individual chose to utilize a tablet anyway. This person spent the period attempting to discretely use the tablet under the desk, locking the screen anytime someone walked by. During other observations, the mistrust seemed aggravated by teacher actions. For example, in some cases there was very little monitoring of the tablets; students were left to use them however they wanted. The one time a student was redirected to get back on task, he went back to the game he was playing once the teacher moved to a different part of the room.

A couple of individuals conveyed the continuous need to have students put their tablets away while they were delivering instruction. One noted, "You can see in the halls they're all zombies they're just they're playing as they walk. They don't even know where they are. In the room I'm constantly having to say, 'put away your iPad or it's mine.'" The survey data backed up

interview statements about misuse of tablets; several responses indicated a sense among teachers that students do not always adhere to the technology rules and regulations in the classroom.

One of the most common types of misuse was students playing games on their tablets rather than using them for a lesson or an assignment. In one classroom the teacher rarely used tablets because "all they (students) do is play games." When students finished their classroom assignments "a lot of kids would just get on the iPad. Some would actually do research and some would kind of just find an app to play a game on." Another teacher stated that students have access to games on the tablets so it "has served as more of a hindrance than an instructional tool."

During one interview, a teacher described the consistent fight against gaming:

> If I'm helping somebody over here somebody over here can be watching a football game cause I've caught kids playing football games, you know, or playing a game or doing something other than what they're supposed to be doing and the filters here, they know how to get around them. They know how to get around. I know they disabled the cameras, they got to get em and put them in back in. I mean, they do things that they're very, they're very savvy, very savvy and I'm not.

I witnessed at least one student in all three classroom observations utilizing a tablet to play or watch a football game, a first person shooter game, or a video instead of participating in the lesson. In one case the student was addressed by the teacher, asked to stop, and then went back to playing a few minutes later.

Tablet life. An additional pattern that appeared in the data was the issue of tablets not working due to depleted batteries or simply being broken.

> The situation was described in one classroom as follows:
>
> They're killing their tablet before they ever get to my class by playing these games wherever else they are so all they want to do when they're in my class with their iPad is charge it, which obviously is not acceptable at that point in time especially when you're trying to use it as an instructional tool.

Four different individuals commented in their survey that student devices are rarely charged or not charged completely. Several other respondents noted that they seem to consistently see broken devices; one individual commented "every time I see a tablet it has a crack in it."

How did teachers perceive the implementation of tablets? Teachers at the middle school campus perceived the implementation of tablets as an opportunity to further their instruction and as something that necessitates continued training. However, they also had some negative impressions about whether or not tablets were a positive force on the campus.

Educational purpose. Interview and survey responses consistently pointed towards using tablets in an educational manner. Responses included:

- educational resource
- use it for educational purposes (six times)
- academic purposes in the classroom

Three teachers mentioned use of the tablets as an instructional tool. It is difficult to discern what respondents meant when using these terms because they did not give further clarification. The only mention of what it means to use the tablets as an instructional tool was from teachers who attempted to make instructional videos for students to view at home. Several interviews and

surveys revealed the desire to try a flipped classroom model if there was time to plan, technology support, and willingness of the students to participate. Based on responses from teachers, there was a perception that students using their tablet during instruction were not listening. Another perception was if a tablet's battery was low the student probably drained it by playing games. One of the teachers said students used their tablets as "recreation items."

Professional development. Professional development was perceived as useful and necessary in order to use tablets effectively in class. Interview respondents indicated that there was training and it helped but it occurred more at the beginning of the year and trailed off. One individual discussed the challenge of having enough time to sit down and learn how to use the tablet. Another comment focused on how the district was "good about rollout of something and then once it's all out there's not a lot of follow through on it." Survey responses yielded similar results. Phrases kept coming up like, "too little time for training," "teachers need time and training to implement technology," "a tablet is a tool which is only as good as its user," "extensive teacher training," and "show the capabilities of the tablets." Four persons mentioned how helpful it was to have a campus technologist dedicated solely to working with the tablets. Secondary campuses each have a campus technologist; the middle school technologists split a portion of their time with the intermediate campuses as well.

Negative perception. There seemed to a sense of negativity associated with the tablet initiative at the middle school campus. Interviewees made a range of comments and used tones that suggested a negative perception of the the implementation. When speaking about expectations for tablets one teacher said, "That doesn't do any good to a twelve year old, they

don't care what the expectation is, they don't want to pay attention so they are going to play let it rain on their iPad until they get in trouble. That's just how that is." This teacher also indicated a belief that the district was following the lead of another district in implementing tablets even though "it didn't work there." Another respondent thought giving "kids an expensive three or four hundred dollar mini iPad they usually end up breaking" was an issue. One teacher sarcastically recalled the promise of "pretty much everything that we wanted to do in the world instructionally would be associated with this tablet and that we would pretty much be running our iPads in every class." The most emphatic response about tablets came from a teacher who said, "I hate them with a deep burning passion from the bottom of my soul! I hate them!" Survey responses also followed a similar trend of negativity using terms and phrases like "sneaky," "not easily usable," "negative," "hindrance," "tablets have not helped at all," "toys" (twice).

The negative perceptions seem to be tied to either a difference in what was promised and what was fulfilled, issues associated with student behavior, or possibly a combination. One teacher commented in an interview, "I don't see them being used as the instructional tools that they were supposedly you know there to be utilized as." Survey responses included phrases like, "tighter control" and "they want to play games on them not do school work."

High School

The high school campus also participated in the implementation of tablets, giving each student the option to utilize their own device in an effort to reach a one-to-one ratio. The implementation came on the tail end of a bring-your-own-device program so the two initiatives overlapped. Students were still able to bring their own device be it cell phone, lap top, tablet, or

they could choose to rent a tablet from the district for the academic year. At the high school, participants indicated access and engagement were change goals but also felt unclear about the purpose of the initiative. There was a sense that goals were not being met because of uneven access to tablets and misuse. Respondents did indicate moving towards a digital classroom was important and that technology such as a tablet was the future of education.

What changes did leaders hope to catalyze through the use of tablets? At the high school campus there were a number of changes associated with the initiative including access, engagement, and flipping the classroom.

Access. Interviews at the high school campus revealed a goal of getting students access to technology, the internet, and information. One teacher commented that "every student would have access to technology and the internet" while another simply said "access to information." Comments were made about getting students access to the internet for research and using technology as a tool for retrieving information and research. The terms "technology," "internet," and "information" seemed to be used interchangeably to mean the same or similar things. Responses indicated that if an individual had access to technology or the internet they had access to information. Survey responses reflected this notion of information access as well:

- It (the iPad) also allows for greater interaction with information because it's all available at their fingertips.
- It makes information much more accessible to the students.

- I have encouraged my students since before the school year began to invest in an iPad for class, especially since we have been attempting in my room to make it easier for students to access assignments and information.
- To allow students to access information not readily available in the classroom.
- Student issued tablets allow for easy access to supplementary materials and online assessments, checking for student understanding, and higher engagement.

Several respondents also perceived not having a tablet as limiting opportunities to reach educational information sources.

Engagement and involvement. One of the topics that was repeated in the high school campus data was engagement and involvement or participation in class. During interviews one individual stated, "Another goal is to increase engagement so that students were more actively engaged in the learning process so it wasn't so passive." The majority of the comments came from surveys with respondents saying they wanted more student involvement and student participation. Others cited the goal of having "engaged students" during class, "engagement," "increase student engagement," "improve engagement levels," and "higher engagement." The responses centered around the notion of getting students to participate in the lesson.

Flipped classroom. A number of individuals commented on their survey about moving towards learning outside of the classroom or implementing a flipped model of instruction. In a flipped model, videos or other materials are made available so students can learn the content outside the classroom; class time can be utilized for specific questions and guided practice. A few teachers noted this model would allow students to complete and turn in their work electronically.

Several individuals commented that with these devices students will do "more inside and outside of the classroom" and it will be easier for them to complete their work when not on campus. Specific statements about flipping the classroom were made in a variety of ways. A couple of teachers were currently trying to implement a flipped classroom model. One noted, "I am currently attempting a flipped mastery classroom so all their lectures are videos so the class can be self-paced." Another said, "My goal was to streamline lectures and flip the classroom so that students could watch lectures at home and practice at school with the aid of teachers and peer tutors." Others indicated that tablets will only work if "teachers can utilize flipped learning so students will not have an excuse if they miss class or fall asleep." Another individual believed "tablets would work well with flipped instruction." One individual believes there is "an emphasis on more of a flipped instruction model." Overall the comments seem to equate tablet success with a necessity to flip the classroom.

Inability to articulate. While there were a few consistent change goals that came out of the high school data, there were also a number of individuals who described an inability to articulate with regard to the changes leadership hoped to catalyze. Words used to describe the expected changes included "assumed," "hoped," and "seemed" while others flat out stated "not knowing what those goals are" or "it was pretty open-ended." There seemed to be a general sense of vagueness for the educators expected to carry out the daily facilitation of tablet use in the classroom. Another respondent noted that no specific instructional expectations were given or any mandates broadcasted to the staff when tablets were introduced on a large scale. Survey responses also included a number of answers that would point towards a fuzziness about what

changes needed to occur in the classroom. Many of these responses suggested teachers were working towards the changes they believed or assumed were desired. Responses to why the high school implemented tablets or what teachers were told about the goals of the the implementation included:

- Try to use the technology
- Students were not instructed on how to utilize them properly, and teachers were only encouraged to use them.
- Limited...suggested it would be a great tool and that all students would have them to enhance research, take assessments, create projects, etc.
- Many of my students are telling me that they still don't know why they have the iPads.
- I was told nothing except that technology needs to be a part of the education process in my classroom.
- If there is a goal or mandate for a certain level of implementation, I have not heard it.
- Not much. It was "they have iPads, use My Big Campus, come to some trainings if you'd like."
- I don't even know if specific goals were made.

There was definitely some expectation of tablet use as described by teachers but it was not clearly defined and one individual summarized by saying, "Teachers seem to be expected to implement technology on their own terms."

To what extent were stated goals for the initiative realized in practice, and what factors facilitated or hindered the realization of these goals? As previously reported, some teachers found parts of the stated goals being met while others could not describe a focused set

of changes to target. The high school data seems to indicate a lack of growth towards goals overall with more factors that hindered rather than facilitated desired changes.

Lack of growth towards goal. Interview and survey response data both pointed towards the campus not showing growth towards goals. When asked specifically to what extent they thought district goals were being achieved, interviewees answered with statements like "I don't think they have" and "it hasn't gone the way I hoped and I don't think that this is the way they would expect them to be used." One teacher felt like students not having devices was getting in the way of reaching district goals and another interviewee indicated some teachers were doing well and "have really run with it" while others are struggling. Survey responses echoed the lack of growth towards goals with comments such as:

- Not very well.
- It is difficult to reach goals when students don't have the device.
- We have not reached our goals.
- Not sure if goals were even set.

The biggest hindrance seems to be either a lack of understanding about what the goals were or students not having a tablet.

Uneven access. A lack of students having a tablet or bringing it to class was the most common comment in surveys or statement in interviews and was also observed consistently in classrooms. All four teachers who were interviewed made reference to the fact that not all of their students had a tablet or access to a tablet. During these conversations one teacher stated "40-50%" of students had tablets in their class, another said it was more like "30-40%" while the

lowest figure thrown out was “one out of ten kids have tablets.” Fees were mentioned as a possible barrier to entry for some families and another teacher said that some parents were unwilling to sign the twelve page agreement required by the district.

The trend for commenting on a lack of student participation in the program was similar in the survey responses. Three-fourths of the high school surveys had comments and concerns about not enough students having a tablet. Responses included:

- Lack of participation among students.
- Only half the students have tablets.
- Not everyone has chosen to get one.
- There are not enough students using the tablets to garner real results.
- Students do not like the 12 page agreement and some won't sign, technology fee, restrictions on using the iPad are just a few.
- Students do not have the technology.

During observations, it was not possible to determine which students had checked out a tablet for the year but I could see who chose to utilize one during class. Every ten minutes the number of tablets being used actively by students was tallied. In the first class, only five tablets were being used by students; in the second class four tablets were in use, and in the third class three tablets were being used. Altogether the classes had the potential for seventy-five tablets to be used and at the peak times of use a total of twelve tablets ended up actually being utilized; that equals sixteen percent. Of the twelve tablets in use, only three were used for educational or on task purposes; that equals four percent between all three classes.

Cell phones. Another pattern that emerged that may be closely related to a lack of student participation in the implementation was the use of cell phones. Multiple interviewees said that students use their cell phones in class as a part of the bring your own device initiative. Cell phone usage was for research, to look up information, and to access the internet. One teacher said the phones are nice because they do not have to go down to the library to get information and another commented that the phones are good because they can do pretty much everything a tablet can. A couple of survey respondents also noted the consistent use of smart phones in the classroom, one of whom stated, "a large portion of the students rely on their iPhones." During the same three classes I observed (where a total of twelve tablets were used) forty cell phones were used and an additional ten phones were plugged in around the room. Each of the teachers in these classrooms gave students the opportunity to choose which device they wanted to use and many either only had a phone or opted to use their phone. In one of the classrooms there were fifteen students not using a tablet for the duration of the period either because they did not have one or did not bring one. During this class the teacher pointed out two fully charged tablets that were available for use and sitting on the board at the front of the room. Nobody used them, asked to use them, or expressed any interest in them.

Misuse. Another challenge that made it difficult to reach goals was the misuse of tablets by students. Several surveys indicated that teachers have had to spend a lot of time watching for the misuse of tablets because of "students misuse of equipment." One teacher commented that it would be nice if students used the devices right and another said, "too many students embrace this technology as an easier way to cheat and plagiarize." When asked about what is hindering

them from reaching district goals another teacher responded, “Students played games, made illicit recordings/videos, took pictures of teachers, and made memes etc.” There seem to be some real challenges associated with monitoring a device that gives students access to so much information. A number of tablet users were observed doing things that could be considered off task or not for academic purposes; cell phones were used for off task purposes as well. In one of the classes two devices were used to play games, five were used to text, one to surf the web, and another to watch videos. In another classroom students used phones and tablets to view pictures of cars, one of the students had a tutorial video playing on a tablet while using a phone to look for music on iTunes, and a third student was using his phone to text someone while the teacher was helping the person next to them. In the third classroom phones were used for the game Words With Friends and Facebook. Five of the students in the room had in earbuds and appeared to be ignoring the entire lesson. One of the students used her tablet as a mirror to help apply makeup. If students were not disrupting class and kept to themselves, they were largely left undisturbed by the teachers.

How did teachers perceive the implementation of tablets? Teacher responses commented on desires of going digital and the need for training more than anything else. They seemed to see tablet use in the classroom as the future but there was also a sense that this initiative won’t work unless it is required.

Going digital. Some of the responses from the high school participants emphasized tablet use as an opportunity for classrooms to go digital and move away from books and paper. Referring to students, one of the teachers commented, “Some of them just hate books for some

reason and they want to use a different avenue of research." This sentiment was shared by another teacher who said his or her class hardly every uses textbooks anymore. Another teacher said, "You don't need books anymore because everything you can find is online." There were also a couple of comments that just referenced "going digital" and "student textbooks can be downloaded on their devices." A pair of survey respondents also pushed the idea of online textbooks and "discontinuing the use of physical textbooks." Teachers also seemed to really want less paper used in the classroom. Reasons for this included the time and effort it takes to pass out and collect papers, reducing hassle and clutter, time stamping electronic submissions of assignments, software that can check for plagiarism, and saving "thousands of sheets of paper" on science labs. Another teacher added that going to a digital format for homework and assignments allows for immediate feedback because the student and teacher can communicate immediately instead of through a paper trail. In one of the classrooms I observed the teacher encouraging the class to download an app that contained content relevant to the class rather than obtaining a paper copy. A portion of respondents at the high school seem to have a preference for digital material.

Professional development. The need and preference for training and professional development was another theme that emerged. Several interviews suggested training as the guide for what was being done with technology in the classroom. One teacher in particular appreciated that new trainings are "coming around everyday" and "they have Saturday trainings for us if we want to go." Another individual discussed the challenge to prepare such a large number of teachers to use technology because of different comfort levels.

She noted:

> Some of them will get in there and learn it and other ones just don't have the skill set or the desire to do that and so I think there's been some classrooms that have really run with it and some classes have really struggled with implementing any type of technology.

Survey responses backed up the preference to have training and professional development in order to make tablet use effective. Several respondents indicated they needed more time to train; a couple of comments went into further detail about the need to learn how to incorporate tablet use into daily activities and assignments. While the range of comments was across the board from the general need for training to the specifics of how to incorporate tablets into daily lessons, there was general agreement that professional development was a necessity if tablet use is to be successful.

Requirement. One of the minor themes to emerge from the high school was a desire by some to have tablet use required by teachers and students. There were a few individuals who felt that this initiative would fail if use was not mandated. One teacher commented that unless students were forced to get the tablet they will choose not to and there was not much teachers could do about it. Five survey respondents commented that it would help if students were required to rent the devices from the district and another said teachers should be required to give tests and quizzes online.

Future. The final perception among teachers to come out of the high school data was the notion that tablet use seemed to be future of education and it is what students can expect if they go on to college. Responses described this in a variety of ways. For example, one teacher said, "For tablets it was to kind of be coming into the 21st century and this is what students are going

to be using in the future so we needed to introduce the technology now and become comfortable with it." Others said it would prepare students for the future where there will be more online learning or they need to be ready if they go to college after they graduate because they will use more technology there. Survey respondents also reference 21st century learning, helping kids to be ready on a global scale, and another commented, "It is where the world is going why would we not integrate?" Teacher comments suggest they see teaching and learning inevitably heading this direction so there is value in getting students used to it at an early age.

Cross-Case Findings

Each of the three campuses had a own unique situation but there was also a story to be told when looking across all three campuses to see if there were any themes or patterns that emerge from the aggregated data. Some of the campuses were in alignment when it came to access to the internet, engagement, and an inability to articulate. Other themes such as playing games, cell phone use, and the ability to be self-paced were more prominent in only two of the three campuses.

All Three Campuses

What changes did leaders hope to catalyze through the use of tablets? Across all three campuses it was clear that greater levels of access to technology and information were desired changes. There was also a portion of individuals who felt an inability to articulate with regard to what changes were expected.

Access/Exposure and bringing technology into the classroom. Across the three campuses there were seventy-eight references from forty different data sources (surveys interviews) related to getting students access. In some cases respondents wanted access to

technology, in others it was to the information, and in others internet access was desired. Different participants focused on one or more of those areas but there was consistent agreement that “access” was an important change. Some respondents really valued the ability to have students use technology themselves without having to go all the way to the computer lab. Several individuals mentioned the need for students to have technology in their hands and being able to get to technology whether they were at home or school. Others wanted to get students used to technology and expose them to as much of it as possible.

Information access was described differently by multiple respondents; some said it was about research, online assignments, or discussion questions while another said it was about interacting with information in new ways because “paper only goes so far.” One person described tablets as a tool for students to access information and they need to learn how to use that tool. Technology was also depicted as a way for students to “learn information in specific, immediate and consumable chunks.”

Many of the responses about access centered around getting students connected to the internet. Participants wanted students to be able to access instructional videos at home, solve their own problems by searching for solutions while teachers act as more of a guide, or find current information and “first person letters and papers.” One teacher commented, “The internet is changing the way people get information and how they learn.” Another praised tablets as a venue for getting direct access to the internet so students can obtain information for research. The main push for access seemed to be a goal of removing or reducing the barriers to

information such as speed because tablets allow for almost immediate feedback and geography because classes do not have to go to a computer lab.

Engagement. Student engagement was another theme that spread across all three campuses. Engagement was referred to as a number of things. For some it was simply engagement or student engagement while others labeled it as a move away from "worksheety" assignments or a move towards "more authentic things…where they can actually create something that's more meaningful." When referring to increasing the level of engagement for students at the end of the day, one teacher stated, "Their attention span is so short but when you put that device in their hands they feel like they are playing a video game and so it's a lot easier to trick them into learning." Others saw engagement as getting students at lower levels to participate in the lesson and to utilize the device to do things that paper and pencil cannot. Responses varied with regard to what the term engagement actually meant.

Survey responses and interviews included twenty-three individuals mentioning the word engagement. In some comments, tablets were mentioned as a motivator for engagement while others said a tablet was a way to maintain engagement in the classroom. Flipping the classroom was one of the ways teachers referred to "engaging every learner." Several mentions of engagement also included giving students a variety of avenues for learning, getting them more excited about learning, and another suggested they might stay engaged longer because of the "unlimited amount of information" available that a textbook might not have.

The other piece of engagement that was referenced heavily was the notion that tablet use was more interactive and helped students to participate more. One teacher described how tablets

were a better way to engage students in geometry through drawing shapes and resizing them without being hindered by eraser marks and a messy paper. This was called “hands on approach to learning” by one teacher and another called it making “learning interactive and fun.” The responses about engagement are strung together around the idea of pulling students into the lesson, helping them to learn more, and to be fully present in their education.

Inability to articulate. While access and engagement themes emerged from the data across all three campuses there was also an apparent inability to articulate with a number of staff members about what the desired changes were for the tablet initiative. According to the coordinator for instructional technology the two main goals for the tablet initiative were “to provide an avenue for kids to access news and create content” and “to provide textbooks in a digital way.” The district hoped to accomplish both of these goals for as many people as possible. Data revealed a variety of responses about why staff believed their district implemented tablets. Some respondents did not know at all why the implementation occurred stating, “I have no idea” or “I don’t remember there being any.” Others knew there were expectations somewhere but had not heard what they were. For example one teacher said, “not knowing what those goals are it’s hard to say I’ve reached them” and “I don’t remember any written goals. I’m sure they are somewhere.” There was another group of individuals who described more of a fuzzy state of expectations using words and phrases such as fluid, open-ended, and nothing clearly defined.

Common themes from interview responses were also shared among survey responses across all three campuses. Comments fell into groupings of individuals who had no idea, those

who knew there were expectations but not what they were specifically, and individuals who believed there were a set of open ended expectations. Those who did not know at all commented:

- I do not know.
- Nothing really.

The next group of responses indicate an awareness that district leadership had a desired outcome for staff members but it was not communicated directly to individuals at the campus level. Those who didn't know the specific expectations said:

- I am not aware of any goals.
- We were not given any direction.
- Not sure what the targets were.
- Unsure because there wasn't ever a clear goal communicated to us.

Another group of respondents believed the set of expectations were communicated at the campus level. Responses in this category point towards a general set of guidelines with more of a vague direction. These individuals understood the expectations to be open ended as evidenced by statements such as:

- Just that we were expected to use it as much as possible within the classroom.
- Try to use the technology.
- Teachers were only encouraged to use them.
- We were told we could implement the use of them into our lessons as we see fit.
- Limited…suggested it would be a great tool.
- Teachers seem to be expected to implement technology on their own terms.

There were also some who believed there were no goals at all:

- I don't believe goals have been set.
- I don't even know if specific goals were made for the devices/implementation.

Although there was no uniform reason for not knowing or understanding the expectations of the initiative, out of sixty seven individuals, thirty four of them indicated they were not clear on the goals of the initiative.

To what extent were stated goals for the initiative realized in practice, and what factors facilitated or hindered the realization of these goals? Responses for this question pointed toward a general lack of growth towards goals and more hindrances than facilitators in the eyes of the staff from the intermediate, middle, and high schools.

Lack of growth toward goal. When asked if district goals were being met, interviewees consistently answered in the negative. Answers across contexts included the phrase “I don’t think they have been” or “I doubt they have been.” It appears that many of the responses about whether or not the goals have been achieved were in response to an assumption about what the goals were since many of these respondents already stated they were not clear to begin with. This may be a part of the reason answers to the question were less definitive and consistently included “I think” in them.

Some of the survey respondents also felt that district goals were not being achieved. Answers included “not very well” or “I don’t believe they have been reached” or “not good.” Others indicated that goals were not even close to being met, stating, “they have not at all” or “I do not feel we have reached any goals.” As part of the question about whether or not district goals were being achieved, respondents were asked if they were tracking data. Each individual

who responded with a statement doubting the growth towards district goals either did not refer to any data or stated that they were not collecting data. This indicates respondents perceived a lack of growth towards district goals since they did not provide evidence supporting their comments.

Uneven access. Several themes related to "road blocks" were getting in the way of reaching district goals. The single most mentioned hindrance was that not every student had a tablet. This was stated during interviews across all three campuses, noted in surveys, and present in observations. Several mentions were made during interviews that not every student had a tablet. In some cases it was mentioned casually and in others the entire response was centered around students not having tablets as the biggest hindrance teachers were encountering. Certain classrooms shared a cart of tablets which posed its own set of challenges due to reservations, timing, and a limited number of carts/tablets. Some of the parents did not want to pay the fee or sign the contract and others feared it would be a distraction.

One of the other issues teachers had with the number of students that did have tablets was the state of limbo it put their lesson plans in. Students with tablets could do some things but the others had to have paper copies or some sort of equivalent. It made it difficult or impossible "to go completely digital," as one teacher put it because there were not enough devices being used.

Surveys revealed a similar trend as comments evidenced a lack of participation from students and a difficulty related to uneven access. Many of the responses included remarks about students not wanting to sign up for tablets, not wanting to pay the fee, or choosing to opt out. Several comments also suggested that there was not enough participation "to make it functional." At the intermediate level observations revealed students had to access tablets from a cart and the

only way that happened was if it was in their classroom at the time. The cart usually had enough tablets for all students; however, there were usually four to five tablets that would not hold a charge or were otherwise broken. When a tablet cart was in a classroom, all students had access to a tablet during that period but that might be the only class they use them in for the week. At the secondary campuses between all six classes one hundred thirty-six tablets could have potentially been in use and twenty-one were actually observed in use. This would certainly support the data that not everyone had a tablet or at least not everyone brought it to school.

Misuse. Another pattern that came up in responses to what had hindered the reaching of district goals was misuse of the tablets by students. Some respondents commented on the fear of misuse while others discussed actual observed misuse. Misuse was described in multiple ways including improper use of the camera and video functionality, surfing the web, and playing games. Most often the misuse of tablets resulted in students being off task which went directly against one of the goals that many teachers stated of increased student engagement. Interviewed teachers talked a lot about having to consistently watch when tablets were being used because they were a distraction during instructional time. Students took pictures and videos and sent them to one another or looked up videos and surfed the web when they were supposed to be paying attention. The single most commented on misuse of the tablet was playing games; teachers frequently noted that tablet batteries were dead or dying because of how much game play occurred.

Focus groups conducted at the intermediate and high school campuses (with students) also confirmed the use of tablets to play games by students. Both focus groups affirmed that tablets were used for class and to perform research but also for game play. During observations, I

noticed at least one person in each room with a tablet playing games at the secondary campuses; I did not observe anyone at the intermediate campus using a tablet for gaming. At the secondary schools, it was common to see students listening to music on their tablets, playing football via a tablet gaming app, or watching videos. There was usually at least one tablet user in these classes that consistently angled their screen away from the teacher or would switch between apps or screens when teachers walked by. Many of the comments about misuse involved monitoring and emphasized how much more monitoring had to take place in the classroom. However, observation data did not reflect such increased monitoring of devices; in fact the opposite seemed to be true. If students were quiet with their device, they were largely left alone. In some cases they would be redirected but often went right back to their previous off-task use when the teacher went to a different part of the room.

Common understanding of vocabulary. A final pattern that emerged from the data was not directly stated by teachers but seemed to stand out when looking across campuses which was whether or not there was a common understanding of vocabulary. There were a few terms that come up a handful of times across the campuses. Teachers referred to tablets as an avenue to "conduct research," a tool that was "interactive," and a device "intended for educational purposes." The term "research" came up quite a few times as one of the benefits of tablets that changed the classroom. Research was almost always associated with going online and finding information or using a search engine to access information. Interviewees said students would "do research" or research had become easier and "the research we do on the phones they can do on the tablet." Survey and focus group participants also commented that tablets were used for

research and now “research is easier.” Only one teacher commented about how important it was for students to learn information literacy during the process of searching online and trying to find information. Every other individual that commented only used the term research as something to do and made it sound as if all students know how to research using tablets successfully.

Another term that was used multiple times by individuals at each campus was “interactive.” The tablets are better because they are “more interactive in the classroom as opposed to just those mundane tasks they’ve had in the past.” One teacher said students can interact with information better than they could with paper. One classroom teacher described assignments as “a lot of the traditional you know pencil and paper, writing things down, still did a lot of group work but it wasn’t quite as interactive.” Some survey respondents equated “interactive” with being more fun or modern; others simply said assignments and learning were now interactive. The term interactive seemed to be used in a binary way; before the tablets learning was not interactive but now with the tablets learning was interactive. During one of my observations students used QR codes to look up information on individuals they were required to learn about. Once information was pulled up on their tablet, they copied the information into a notebook or journal. It was difficult to tell what teachers meant when they said interactive because a common definition did not appear to be used.

The final phrase that kept coming up from responses in the data was that tablets were “intended for educational or academic purposes.” Teachers said the tablets were for instructional purposes and others said educational purposes or to be an educational resource. Some of the references to these terms were used in addition to being “fun, but still educational.” Other times it

was simply tablets need to be for an "educational purpose" without further elaborating what that meant. The high school focus group also said tablets are for educational purposes but did not develop their answer any further. Based on the way these terms were used by respondents it is difficult to discern whether or not there was a common understanding of vocabulary surrounding tablet use.

How did teachers perceive the implementation of tablets? Data from individuals across the three campuses revealed some commonalities in perceptions about the implementation of tablets specific to: (1) professional development, (2) tech savviness, (3) going digital, and (4) preparing for the future.

Professional development. Some participants at each campus perceived professional development and training as an important component of tablet use in the classroom. Responses included multiple mentions of numerous trainings offered throughout the year and access to a campus technologist for targeted support. Several teachers noted that their ability to create and post videos or use certain apps in their lessons was a direct result of their training. While some reported training was available through workshops, at staff meetings, and even through outside events, others said they did not get much training or any training at all. Several teachers felt they did not have adequate time for training or that additional time and support would benefit them. One interviewee commented, "We have some things we can access and some online training we get but we really haven't had a great deal of training." Another interviewee believed training was heavy early on and dissipated throughout the year. He stated, "I think education as a whole is very good about roll out of something and then once it's all out, there's not a lot of follow

through on it. We get a lot of training at the first part of last year and then some supplemental throughout the year." A few individuals commented that some teachers just seem more comfortable and pick things up quickly while others struggle with the learning curve. Comments were also made about the importance of learning to use tablets on a daily basis and "to improve instruction or assessment." Whether teachers felt plenty of developmental offerings were made available or that they did not receive adequate training, there did seem to be an emphasis of the importance placed on professional development as perceived by teachers.

Tech savvy. Another teacher perception common across contexts was the notion that students were much more tech savvy and comfortable with tablets then teachers. Several teachers noted that students could do things that they could not on the tablets and labeled students as "tech savvy." Referring to students one teacher said, "They've always had technology versus the teachers so we need to catch up to speed." Another said teachers tended to be behind the learning curve when it came to technology. The idea that students were much more comfortable with technology than teachers went hand-in-hand with the comments that teachers were not confident when it came to tablets. One educator expressed a lack of proficiency with a "regular computer much less a tablet." Survey respondents indicated "students still know way more than we do" and repeatedly described technology as familiar and comfortable to them. There were a few teachers who said they felt comfortable with technology or at least were excited and willing to learn more but they were in the minority of respondents.

Going digital. Moving to a primarily or all digital format for learning, assignments, and classroom management was another one of the perceived desires teachers conveyed in their

responses. Persons on every campus expressed not only a desire but an excitement about replacing books with some sort of digital or online equivalent. Teachers were seeing a district-wide push for implementing digital textbooks and believed that students preferred a digital format. Some teachers didn't feel there was much need at all for textbooks because of the access to the internet and search engines. Other teachers commented that physical textbooks were going away altogether and all the content they required will have to be accessed online. Reduced cost, greater availability, and more options were other reasons listed for moving to a digital format. Student focus groups also commented that digital books were easier to use, information could be found faster, and research could be done in the classroom rather than taking a trip to the library.

Aside from replacing books, teachers also perceived widespread tablet use as a way to consume much less paper. Grading was said to be much easier if assignments were digital. They could be submitted with less hassle, time stamped, and given immediate feedback. Digital mediums were also described as more forgiving than paper when erasing mistakes. One teacher described the ability to cut down on the clutter with digital assignments. Students who forgot their assignment or lost a handout could easily access another copy instead of having to physically run one off. Going digital seemed to be a way to simply the classroom for teachers and was perceived as a way to make their work more efficient and allow more time to teach and address student needs.

Future. A final area of agreement across contexts was a belief that incorporating tablets into the classroom was the future for students. Many of the comments were based on the kind of world we live in now and what students will be doing upon graduation. Comments included words and phrases such as “we live in a digital world,” “global access,” “21st century learners,”

"modern," "age of information overload," "global culture," and "technological age." Other comments were about students needing to "prepare for the future of learning" and "college will be like this (all digital) so they need to get used to it." Some teachers felt technology was the only way to prepare students for the future job market and get them ready for a career. Another simply believed this was "the direction the world was headed so why not get onboard?" Although not entirely clear what the future will look like, teachers perceived technology use as a pivotal part of preparing for it.

Across all three campuses data revealed access to the internet and engagement as important change goals of a tablet implementation. Along with these areas of agreement, respondents also indicated an inability to articulate about the intended goals of the implementation. A perceived lack of growth toward district goals was fueled by uneven access to tablets and misuse. A lack of common vocabulary also contributed to the vague understanding of the purpose of tablets in the classroom. Other considerations that came from respondents across campuses were cell phone use, the ability for students to pace themselves, the importance of professional development, and the view that technology was the future of education.

Chapter Five: Implications

The purpose of this study was to explore the implementation of a tablet initiative as it unfolded in one school district and to examine the degree to which actualized use of the technology approximated stated goals. The study was guided by questions involving the changes leaders hoped to catalyze, the extent to which stated goals were realized along with factors that facilitated or hindered reaching those goals, and the perception teachers had of the tablet implementation.

This chapter includes a summary of findings and outlines areas of intersection between this study and previous research. Recommendations for district and campus leaders who might be considering a tablet implementation of their own follow these intersections. Limitations are examined based on the scope and scale of the study, and the chapter concludes with a look at areas of potential future research to build on or bridge with this work.

Summary of Findings

Findings from this study are organized according to research question. The first question addressed the changes leaders hoped to see through the use of tablets. A look at the extent to which goals were achieved in practice, including facilitators and hindrances follows the first question. Next, teacher perceptions of the implementation are discussed briefly.

Changes leaders hoped to catalyze. This study found leaders hoped to initiate two primary changes through the use of tablets. The first change was a common desire for students to become more engaged learners. Tablets were viewed by leaders and teachers as an avenue for students to participate actively and be drawn into lessons in a way that previous teaching tools could not. Respondents perceived perceived students as being immersed in a digital world and

consistently using mobile devices to navigate through their daily lives. Incorporating tablets into schools and classrooms became the logical way to meet students where they were and interest them in education through a medium they preferred.

Leaders also desired to give students access to tablets and bring technology into the classroom. Prior to the tablet implementation, students relied on either bringing their own device or going to a computer lab if they wanted direct access to technology. Tablets were a convenient way to bring access to the Internet directly to a student and allow them a steady stream of access to content as well as the ability to communicate with multiple methods. Putting tablet devices into the hands of students allowed them to open a door of possibilities and experience the freedom to try new learning opportunities quickly and efficiently. This efficiency extended into the applications that could be downloaded for a variety of purposes as well.

Engagement and access were clear goals that came from district leaders. However, an equally clear finding was that teachers had an inability to articulate in regard to their understanding about the changes leadership hoped to accomplish through the implementation. Teachers did not see nor hear a clear goal about why tablets were being used. Educators also felt unclear about how they should specifically be using tablets in the classroom. More than anything, there was a sense of uncertainty that shrouded responses about the changes that were desired outcomes of the implementation. This vague understanding of change goals left many teachers to either create their own or hope they were doing what was expected of them.

Extent goals were realized in practice. The common theme surrounding whether or not district goals were realized was uncertainty. It is not surprising to see uncertainty if teachers and

staff were not sure what the goals were in the first place. Engagement and access were achieved in pockets; some teachers found success in both of these areas while others said the opposite.

Facilitators. One of the facilitators that helped teachers reach district goals was the amount of professional development available. Teachers tended to believe there was ample training available to them, at least during the first part of the year. Staff members felt they could reach out to their campus technologist if they needed anything.

Hindrances. In this study, a number of factors were identified as hindrances to reaching district goals. Students had uneven access to the tablets, which was an impediment for the schools moving toward district goals. The initiative was set up so students at secondary schools had the opportunity to use a tablet while students at primary campuses could use a tablet from a cart. The cart system limited the ability for students to access tablets based on a classroom reservation schedule. In both secondary campuses, all students could have used a tablet potentially, but many of them either chose not to rent one from the district or did not consistently bring their device to school.

A second common hindrance was misuse of tablets. This issue was twofold: teachers had either dealt with students misusing tablets in their class or feared misuse in the future. At the secondary campuses, students routinely used their tablets for playing games, watching videos, or looking around online in a context that did not align with the lesson. This created a fear of misuse in the minds of teachers leading them to often mistrust students and assume off task behavior.

A third hindrance identified in this study was a lack of common vocabulary. Common terms and phrases were used when discussing teaching and the use of tablets, but respondents

often identified uses or benefits of the tablets without giving further details or description. This displayed a disconnect or gap between what teachers believed they were doing correctly with how students were using their devices in actuality. One of the common phrases used was that tablets needed to be utilized for "educational purposes." Educational purpose can have a broad range of meanings or a narrowly defined meaning depending on how the term is used. Context and expectations play a role in ensuring leaders, teachers, and students all understand what constitutes an educational purpose. A lack of aligned understanding was displayed with the words "research" and "interactive" as well. In each case, a term or phrase often meant different things to different individuals.

Teacher perception of the implementation. Teachers had their own perceptions of how the implementation went and viewed the day-to-day use of tablets through their own lens. Teachers perceived professional development as a necessary element for success in order to prepare teachers and grow their ability to weave technology into their teaching in an effective manner. Educators believed professional development was offered frequently but with a heavier weight in the earlier part of the school year. Though teachers believed there were regular opportunities for training, they also felt they never had enough development and did not have adequate time to get comfortable.

Another perception teachers had was that students, as a whole, understood technology much better than the general population of teachers. There were exceptions to this, but teachers seemed to feel they were at a disadvantage when it came to understanding and incorporating tablets in the classroom as if they were in a constant state of having to catch up. Teachers viewed technology use as foreign to themselves but natural to their students. They often referred to

students as a homogenous group having grown up with technology and consistently using devices comfortably.

A third teacher perception from this study was the need and desire to move towards a digital classroom. Teachers saw the tablet implementation as an opportunity to get rid of paper and textbooks in order to use digital copies of everything. The traditional style of passing out papers and grading by hand could be replaced with digital, more efficient methods thereby reducing some of the burden the teacher carries. Discussions could occur online as well as the posting and submission of assignments and tests. Ideally, this would free up teachers to address more specific student needs because teachers would have to spend less time on administrative tasks.

A final perception shared by teachers in this study was the view that incorporating tablets and other technologies into the classroom was the direction education was headed in the future. Students would use technology eventually in college, their career, or both, so they need to start getting used to utilizing devices for purposes of productivity. There was a sense that using technology was part of being a responsible citizen in a world where people are connected globally. Students needed to learn to use technology because it would inevitably be a part of their future.

Implications and Intersections

This study intersected with several different areas of existing research. The primary areas of concern centered around leadership, teaching, and technology. Issues ranged from communication, vision, and messaging; to teaching and managing a classroom with technology; to issues of access and information literacy.

Communication, vision, and message. This study underscores the importance of establishing a foundational vision as suggested by Webster & Lusch (2013) who highlight the importance of vision in order to build a marketing message. This vision must to be created with multiple perspectives by individuals in various roles across levels within an organization (Berrett et al., 2012; Ertmer & Ottenbreit-Leftwich, 2010; McLeod & Richardson, 2013; Webster & Lusch, 2013). This study aligned with current research (Berrett et al., 2012; Levin & Schrum 2013) about how clarity of message impacted the ability of members of an organization to receive and understand the vision. According to one study, conveyance of the shared vision came from the top levels of leadership (Webster & Lusch, 2013); in the context of a school district, the responsibility falls upon central office administrators and campus principals.

Teaching and technology in the classroom. The findings of the present study dovetail with research in merging teaching and technology in the classroom. Bringing technology into a classroom introduced a whole host of challenges and questions to navigate. Issues included Technological Pedagogical and Content Knowledge (TPACK), learning to teach with technology in specific and meaningful ways, and classroom management.

One of the findings from this study revealed an obvious challenge for teachers in connecting pedagogy, content, and technology. A complex relationship needs to be negotiated in order to achieve effective tablet use in the classroom. This aligned with previous research (Mishra & Koehler, 2006) that indicated an ideal overlap where subject matter, the practice of teaching, and technology created optimal learning conditions. Application of technology in the classroom setting is seldom a straight-forward endeavor; rather, it requires subtle understanding in each area—technology, pedagogy, and content, for success (Koehler, Mishra, & Cain, 2013).

In addition to understanding the importance of technology, pedagogy, and content, this study also found value in the ability of a teacher to understand how to teach with technology in meaningful ways. Teachers were in need of direction and specifics about how they were expected to teach with new technologies in the classroom. This study found educators needed more than a general encouragement to incorporate tablets but rather targeted and explicit instructions. Professional development conducted this way lined up with research (Ertmer & Ottenbreit-Leftwich, 2010; Pegrum, Oakley, & Faulkner, 2013) aimed at targeting training in a specific context.

Information literacy. One of the other pieces of current research this study intersected with was the issue of information literacy. Students were using tablets and other mobile devices to look up a variety of information on the Internet. There is an every growing need for students to filter through the information they find on the Internet because sources and information often come in a fragmented form (Taylor, 2012). Increased access to the Internet along with a broad understanding of the word "research" can lead to erroneous information, and students need specific coaching about where to look and how to question what they find. This aligns with research suggesting the importance of proper strategies for online inquiry (Colwell, Hunt-Barron, & Reinking, 2013) and questioning results (Kingsley & Tancock, 2014). Several studies indicated students have the ability to filter information correctly; what they need is an audience with expectations and a purpose to filter (Colwell, Hunt-Barron, & Reinking, 2013; Kingsley & Tancock, 2014; Taylor, 2012).

Uneven access. Access to tablet devices was found to be uneven in this study. Either a student choosing not to rent a tablet from the district or simply not bringing their device to

school compromised access to tablets in the classroom. The digital divide creates gaps in schools that must be investigated. Some research (McLeod & Richardson, 2013) not only agrees with this but further states that helping educate parents at home can address this gap. The digital divide is complex with multiple layers and individual circumstances to traverse. Students not accessing technology or using it effectively can stem from a number of factors, but before anything else can be addressed, each individual student must have access to a piece of hardware (Hohlfeld, Ritzhaupt, Barron, Kemker, 2008).

An additional factor further complicating the need for access to a district issued tablet is the infiltration of cell phones into the lives of most teenagers. Cell phones are "basic equipment" for most teenagers and often their preferred method of media consumption (Roberts & Foehr, 2008, p. 12). In this study, students using cell phones outnumbered students using tablets almost three-to-one at the high school campus. It was much more common to see students at the high school using their cell phone than any other device. Cell phones are compact and easy to use, but they are not the same as using other devices to engage the digital world. Accessing content via a cell phone is not an equal substitute for the creative abilities found in other mediums (Modarres, 2011).

Recommendations

Given the findings of this study, as well as the state of research on these issues, I identified six factors for leaders at various levels to consider if implementing tablets: clarity of the message, common understanding of vocabulary, information literacy, teaching with technology, uniform access, and monitoring.

Enhance clarity of the message. Leaders should enhance the clarity of their message when communicating the shared vision established for a tablet initiative. A clear message will be concise and understandable, include a "what" and a "why," and should be heard from individuals in leadership.

The vision for a tablet initiative will drive everything that follows so if it is communicated incorrectly or is difficult to understand, unnecessary challenges are likely to follow. In light of this study, leaders should consider what kind of harm a vague or unclear message might do and how it might impact future change initiatives. A clear message will not be filled with jargon, cliche terms, or phrases that have no actionable meaning. The simplicity of the message should make it easily repeatable so any member of the district can state it similarly or phrase it in his or her own terms. Other research on technology integration (Berrett et al., 2012; Levin & Schrum, 2013) also found that success of a technology initiative required a clearly communicated message.

Another critical aspect of the message is including a "what" and a "why" as a part of the communication. Staff members need to know what the leadership in an organization is charging them to do and why the individuals that make up the organization are doing it. Leadership needs to communicate enough specificity about what the initiative is in order for staff members to feel comfortable carrying it out. If there is a fundamental lack of understanding about the "what," educators could feel frustration about whether not they can accomplish the vision. They may even develop a lackadaisical attitude because the message was not important enough to explain clearly. Explanation of why the implementation is occurring is equally as important as the "what." Making sure the individuals in an organization know why tablets are being implemented

will give the individuals working day-to-day on the implementation a purpose behind their efforts. Explaining "why" also allows those who are not in leadership positions to see the "bigger picture" and how their role makes a difference. This aligns with research (Berrett et al., 2012; Levin & Schrum, 2013) about the significance of establishing connections between decisions, vision, goals, and technology.

The responsibility of the district and campus leaders is to ensure the message is heard consistently. Faculty and staff need to know that a consistent voice is permeating all levels of their organization because everyone should be moving in a similar direction. Individuals in leadership roles bear the burden of responsibility because they are the leaders and the organization looks to them for guidance. Leaders have the unique opportunity to speak the message with their voice and back it up with their actions. Leaders can make decisions and have the authority to create meaningful change, which either gives credibility to their message or undercuts it. This is consistent with other research about marketing a message (Webster & Lusch, 2013) and expectations of leadership to not only be the voice of the message but to model carrying it out as well (Berrett et al., 2012; Levin & Schrum, 2013).

Develop a common understanding of vocabulary. A second recommendation from this study is for leaders and teachers to develop a common understanding of frequently used terms and phrases. Communication is a two-way endeavor which requires connection from both sides.

It is easy for communication gaps to occur on either side of a message; the person sending the message believes they are clear while the person receiving it may also think the message is clear. If either of them understands a word or phrase to mean something different, a gap occurs. This aligns with research (Janicki, 2011) about communication and language where

words are thought of as containers that the sender "fills" with meaning and the receiver "retrieves." There is often a gap in what was filled and what was actually received, which can lead to misunderstandings without realizing it. Great care must be taken to ensure that leaders, teachers, and students within a campus and district understand the meaning of terms commonly used.

One way to develop a common understanding is to define words or phrases and follow them with examples. Leaders can tell teachers what the expectations are for specific terms but then give them the opportunity to see the definitions in a specific context. Context plays a role in a teacher's understanding of terms. Previous research (McLeod & Richardson, 2013) found that group discussions across the organization provide an avenue for common understanding as well as the opportunity to create and share exemplars.

This study found the following terms and phrases to specifically watch out for "interactive," "educational purpose," and "research." During this study, the word interactive came up frequently when referring to one of the benefits of tablet use for lessons and assignments. During observations, students commonly were found utilizing their tablet in the same way they would have used an analog equivalent. For example, copying definitions from a tablet into a journal is no more interactive than copying definitions from a textbook. Similar uses for a tablet were found in research (Murray & Olcese, 2011) evaluating the usefulness of certain downloadable applications, one of which was an application that created digital versions of flashcards.

In this study, educators largely viewed the term interactive as a binary term; before, lessons were not interactive and now with tablets, lessons are interactive. This removed the onus from the teacher and put it on the device. The responsibility for executing an engaging and interactive lesson falls squarely on the shoulders of classroom educators to carry out and for the campus leaders to expect. Additional research found that there was no substitute for the importance the teacher put on making an impact in the classroom (Bebell & Kay, 2010; Bebell & O'Dwyer, 2010; Laurillard, 2007; Rossing et al., 2012).

Another term that came up repeatedly throughout this study was emphasizing the use of tablets for "academic," "instructional," or "educational purposes." These terms could be considered commonly understood by educators but there is room to debate what constitutes using a tablet academically. Videos or photos could be permitted as educational, but are they only for viewing or can students make them as well? Previous research found mobile devices used for text messaging (Merchant, 2012), social media (Peluso, 2012), and to create multimedia (Rossing et al., 2012; Storz & Hoffman, 2013). Campus leaders need to define what constitutes educational use for tablet devices continuously and expect the educators on their campus to teach in such a manner actively.

A third term frequently used in this study was "research," which was viewed consistently as looking up information on the Internet. This was an especially alarming communication gap when combined with the desire to move towards a digital classroom and a lack of information literacy. Leadership at the district and campus levels should consider placing heavy emphasis on information literacy if one of their goals is to achieve a primarily digital format for curriculum and instruction in the classroom. Previous research (Colwell et al., 2013; Kingsley & Tancock,

2014; Taylor, 2012) has placed a similar amount of importance on teaching information literacy and practicing strategies to ensure it remains a priority.

Teach information literacy consistently. Educators need to incorporate teaching information literacy as a consistent practice when students are working with tablets and other mobile devices where they can access the Internet. Part of the researching process is curiosity, but the desire to understand must also be balanced with a questioning of evidence that is found. There is a consistent cycle of searching, questioning, and examining information against what an individual already knows and has found already. Students who do not question the information they find give a disproportionate amount of weight to information just because it is online. Another study (Taylor, 2012) found that millennial students did not consider the validation or verification of information found online as important. These students did not view the Internet critically.

Another important component to teaching information literacy is challenging students to practice patience and endurance when looking for information. It is likely to take multiple searches and combing through more than one website to find accurate, factual information. The process of searching involves failure to find the right information, but each search informs better ways to filter future searches. Colwell et al. (2013) studied the way a group of middle school students searched online and found that students were reluctant to compare the information they found across multiple sites. Instead these students believed the Internet was there to provide quick access to information. This type of mindset promotes lazy thinkers who take the first thing they can find. It also reinforces an assumption that any information found online is accurate.

Teachers who use the word research to refer to nothing more than finding information on the Internet are reducing the power, credibility, and purpose of legitimate research. Research is a targeted and methodical way of exploring a topic in order to have a better understanding. According to Merriam (2009), an individual ought to know more about the topic after engaging in systematic inquiry than they did beforehand. Students who do not take the time to check sources and follow up what they find open themselves up to incorrect and fallible understanding. A study of online search habits (Taylor, 2012) found that millennial students frequently start with their theory of what a term or topic means and then back fill with evidence and information they find online. This is a backwards way of completing research and approaches learning from a biased perspective.

Multiple studies (Colwell et al., 2013; Kingsley & Tancock, 2014; Taylor, 2012) found that students have the ability and understanding to research critically but often lack the discipline to consistently use the skills acquired to use information correctly. Students who conduct research online without information literacy skills are almost certainly guaranteed to diminish their ability to think critically before communicating what they find. It is vital for the search for new information to conclude with critical thinking before information is shared (Pachtman, 2012).

Rethink teaching practices with technology. Teaching in a school that has introduced tablets means educators must develop their understanding of teaching practices as well as technology, but content and pedagogy should have priority. Teachers have to be given specific direction and training on how to teach with technology. This training should include the

underlying reasons why teachers teach with technology, skills to learn how to become a better facilitator, and specific just-in-time professional development opportunities.

Educators need to understand the TPACK framework; technology, pedagogy, and content are each components of teaching that must be integrated together to reach the highest levels of success (Koehler, Mishra, & Cain, 2013). Placing a tablet in the hands of students does not automatically lead to a better lesson. Students need to be guided in how to use the device which means teachers need a plan for how to use the tablet to educate. The TPACK framework is similar to a three-legged stool; any of the two components without the third will result in a less than desirable outcome. One of the biggest challenges in combining all three components is the tremendous amount of complexity involved in teaching and learning not only for students but also for teachers. Previous research (Mishra & Koehler, 2006) calls attention to this challenge pointing out the intricate relationships that must be navigated and that understanding of context is crucial.

An additional piece of teaching with technology is a shift towards more a facilitator of learning. Teachers with tablets in their classrooms have a tool at their disposal that can dramatically shift the balance of the classroom. They should be teaching skills and strategies for students to seek out self-directed learning. Lim et al. (2013) describes having this type of technology in the classroom as moving the teacher's role from sole source of information to coach or mentor who can ask questions and guide students. Facilitating students to inquire and learn is already good teaching, but tablets give teachers an avenue to extend this practice and take it farther. Previous research (Ertmer & Ottenbreit-Leftwich, 2010; Rossing et al., 2012) has

echoed this sentiment and emphasized the opportunity for teachers to create activities and design lessons that put the focus of instruction on the student.

Leaders need to look for ways to incorporate just-in-time professional development. Teachers in this study commented on a lack of time as an issue with their professional development. There was a desire to obtain training but only so much time could be allocated for learning new technology skills. Instead of sitting through a session that may or may not apply to a teacher, staff members can reach out and get specific, targeted training shortly before they will need it. Although less efficient and more time consuming, previous studies have found benefits of targeted professional development at the point of need (Ertmer & Ottenbreit-Leftwich, 2010; Pegrum et al., 2013). Incorporating professional development in this manner meets teacher needs immediately and in a context for instant application.

Aggressively pursue uniform access. Leaders who implement a tablet initiative in their district should consider aggressively pursuing uniform access to devices for all students. Research shows that a digital gap or divide continues to change and evolve, but it is still there (Hohlfeld et al., 2008; McLeod & Richardson, 2013; Modarres, 2011; Roberts & Foehr, 2008). In some cases, the gap is simply access to hardware; students must be able to physically utilize a device. In other cases, the gap is about the frequency of technology use or even the ability of a student to utilize the device for higher level thinking and creation (Hohlfeld et al., 2008). Leaders must consider the issue of uneven access when implementing tablets.

This study also found that many students either did not have a tablet and chose to use a cell phone or simply preferred the phone to a tablet. District and campus leaders need to make the determination of whether or not cell phones are a viable replacement for tablet use. Modarres

(2011) views cell phones as suitable for basic Internet access and digital use but lacking the sophistication and creative abilities of laptops or desktops. Tablets could be a middle ground between the two offering more opportunity to create than a phone. If students are allowed to use cell phones rather than tablets, it could have the effect of crippling the implementation by removing the emphasis on tablet use in the classroom.

Another part of pursuing uniform access involves educating parents on the importance of the tablet initiative and partnering with them in the process of learning. Education is a community affair, and schools need the support of parents. Communicating the shared vision of tablet use at school is a good way to start the dialogue and involve parents. Fear can be a powerful inhibitor, so educating parents early and often about tablets could prevent parents from being afraid to let their students use a device. Research has shown education or information sessions with parents to be helpful in creating a comfortable and safe digital atmosphere for parents and students (McLeod & Richardson, 2013; Pegrum et al., 2013). Other research has taken it a step further and stressed partnership with parents emphasizing the importance of getting parents on board as early as possible (Levin & Schrum, 2013).

Closely monitor student use of technology. A district implementation of tablet technology should also consider placing emphasis on closely monitoring student use of technology. Key components of tablet monitoring include lesson design, the use of proximity, and setting expectations for proper use of tablets. Tablet use can be a unique opportunity for teachers to involve every student in the lesson and direct their behavior towards learning content. One of the benefits of tablets over projective technologies such as interactive whiteboards is that

using the device centers around the student interacting and learning rather than the teacher being the only active participant (McLeod & Richardson, 2013).

Teachers need to be mindful of tablet capabilities and student behavior when designing their lessons. Mobile devices offer a range of capabilities that can be geared toward productive classroom use as well as off-task purposes. Anticipation of potential downtime can help teachers avoid misuse of tablets by students who finish early. A study incorporating the use of tablets in an educational setting (Rossing et al., 2012) found that unstructured lessons gave students more opportunities for browsing the Internet and playing games with their devices. Students given a task with specific roles and multiple levels of objectives are less likely to have time to be off-task.

Another way teachers can monitor student use of technology is through proximity. Teachers who use the front of the room or their desk exclusively are opening themselves up for off-task behavior from their students. Tablets are personal devices, which give the user opportunity to occupy themselves with a number of online activities. Utilizing the space in the room to be near students as they learn reduces the chances of tablet misuse. Previous research (Allday, 2011; Englehart, 2013) refers to proximity control as a proactive method of monitoring student use and addressing behavioral issues before they occur. This method of monitoring enables teachers to be in proximity to as many students as possible consistently throughout the lesson or period. The added benefit of proximity is the opportunity to dialogue with more students and know their level of understanding with the lesson.

Along with lesson design and proximity, teachers should also set expectations for proper tablet use as a part of their monitoring strategy. It is not feasible for a single teacher to view

twenty or more screens at one time; there will always be moments when tablet screens are not in view. But setting expectations about tablet use can diminish the number of students who will wander off task. Educators should combine an understanding of the age of the students in the room and the best way to teach a lesson to determine realistic expectations. For example, Englehart (2013) recommends breaking up lessons into portions of time where the teacher talking does not exceed five minutes without some sort of student interaction. This can be applied to tablet use by allotting times during a lesson when devices are screen side down and others when they are appropriate for use.

The implementation of a tablet initiative is a complex undertaking involving variables ranging from people and relationships to infrastructure and obsolescence. Technology is dynamic; it is changing and growing constantly, which makes any implementation an ever-evolving project. Enhancing the clarity of the message, developing a common understanding of vocabulary, teaching information literacy consistently, evaluating teaching practices with technology, pursuing uniform access, and monitoring student use of technology all play a role in a successful implementation.

Limitations. All research comes with limitations based on the scope and circumstances surrounding when and where it took place. While the researcher attempted to minimize deterrents when possible, this study was limited by factors including geography, time, and participation. One of the limitations of this study was the fact that only three schools from one district were studied. Examining a limited number of schools in a single district means results could be localized to a specific region or city or possibly only that district. Though results were not generalizable, recommendations are general enough to at least possibly be considered by

individuals who are in a reasonably similar situation. Research questions were designed in such a way that they could be asked of any district and were not intended to target any one in particular.

Another limitation was the number of survey respondents across the three campuses. A total of 250 individuals received a link to the survey in their district email address. Only 50 chose to respond making the response rate 20 percent. Even though this was not a high response rate, there were at least a dozen results from each of the targeted levels. Survey responses were triangulated to help shore up this limitation.

Possible future research. This study resulted in several opportunities for possible future research. Examining an entire district to compare perceptions of a tablet implementation would be interesting. A study of all schools at one ore more levels could yield results that are generalizable and might reveal whether or not a level of consistency exists across all elementary, middle, or high schools in a given district.

Another possibility for research would be to examine a set of secondary classes to study tablet use versus cell phone use and the corresponding student and teacher preferences. This type of study could take place in a school that has instituted either a “bring your own device” program or a tablet program. Part of the current study showed some students appearing to prefer using their own personal cell phone rather than a tablet. Before investing in a district wide tablet implementation, it could be valuable to see how many students would use their cell phone given the choice. There could be value in exploring if any difference exists between student and teacher preferences for a particular type of mobile device as well.

Additional research could be conducted to explore a tablet implementation from the perspective of students as well. This study showed multiple teachers viewing tablet use as

preparation for a future in college or in a career. A longitudinal study conducted over the course of a student's experience in middle school and high school and then tracked through college and a few years into the workforce could reveal how beneficial or superfluous it was to use tablets in their formal schooling. Student success rates could be tracked to see if tablet use correlated with higher graduate rates, college acceptance, or possibly higher salary job offers.

Conclusion

This study examined three campuses in one district that recently implemented tablets in order better understand the changes leaders hoped to catalyze through the use of tablets, the extent to which goals were achieved as well as factors that facilitated and hindered achievement, and how teachers perceived the implementation. Overall the implementation seemed geared toward providing students with a greater level of access to technology and information while increasing engagement in their education. There were mixed responses to the purpose and goals of the implementation with more uncertainty than anything else. Teachers perceived the need for training in order to effectively use tablets as well as a general desire to create a digital classroom partly for efficiency and partly because they viewed technology use in education as the inevitable future. To increase the potential for success, leaders considering a tablet implementation should clarify their message, develop a common understanding of vocabulary, emphasize information literacy, evaluate teaching practices with technology, pursue uniform access to tablets, and monitor student technology use closely.

APPENDICES

Appendix A - Consent Document, Teachers/Administrators

Texas Christian University

Fort Worth, Texas

CONSENT TO PARTICIPATE IN RESEARCH

Title of Research: Tablet Initiative: Goals, Experiences, and Outcomes

Funding Agency/Sponsor: College of Education

Study Investigators:
Principal Investigator: Jo Beth Jimerson, Ph.D.
Student Investigator: Jason Dunn, Doctoral Candidate, Educational Leadership

What is the purpose of the research? The objective of this study is to explore the start of a tablet program as it happened in one school district and to look at the amount of technology use matched stated goals.

How many people will participate in this study? Up to 300 individuals

What is my involvement for participating in this study? Participants could be involved in as little as one, two, or all three of the following: an online survey, forty-five minute one-on-one interview, and a class period observation.

How long am I expected to be in this study for and how much of my time is required? The survey should take no longer than ten minutes. The interview will take no longer than forty-five minutes. The observation will last one class period or duration of a single lesson, approximately forty-five minutes.

What are the risks of participating in this study and how will they be minimized?

Potential risks to participants is minimal. One possible risk is stress related to the privacy of participant responses. This will be minimized by reminding participants that all responses are confidential, known only to the researchers, and pseudonyms will be used for participants and campuses for the sake of confidentiality. Another possible risk is stress related to the demand of time it will require of participants. The online survey should take ten minutes or less, interviews are no longer than forty-five minutes, and observations will only last the duration of a lesson or class period. In addition, participants are free to withdraw at any time should they feel the burden of participation is too great.

What are the benefits for participating in this study?

Due to the size and scope of the research the findings will not be generalizable. However the educational community can still benefit from the results of this study by getting a clearer understanding of the experiences of individuals involved in a tablet program. The details provided by teachers and administrators who have participated in a tablet program will give individuals considering a similar implementation elements to consider. Administrators could benefit from insights into pitfalls that plagued leaders who have initiated the use of tablets in their own schools while teachers may benefit from information regarding student use of tablets in the classroom. The more information available to potential future implementers, the better they can understand the landscape and make informed decisions based on their own context.

Will I be compensated for participating in this study? No

What is an alternate procedure(s) that I can choose instead of participating in this study? There are no alternate procedures, participation is voluntary.

How will my confidentiality be protected?

The investigators will be the only individuals with access to data that is collected and analyzed. Any information that identifies any participants will be removed and all names of individuals and campuses will be given pseudonyms to protect the identities of everyone involved. All data collected through the survey, interview notes, and observational notes will be stored in a secure, password protected computer file with access limited to the investigators. All hard copies of data collected including field notes and consent forms will be stored in a secure cabinet in the TCU investigator's locked office space for a minimum of three years.

Is my participation voluntary? Yes

Can I stop taking part in this research? Yes, participants may withdraw at any time.

What are the procedures for withdrawal?

Participants may withdraw their involvement at any time during the course of the study. They are free to skip any questions or stop their participation at any point during a survey, interview, or observation should they feel the need. There is no penalty for choosing not to participate. There is no incentive offered for participation in the study. If a participant chooses to

withdraw from a survey they may simply choose not to complete it. If a participant would like to withdraw from an interview they may simply stop participating; if, after completing an interview, a participant would like to withdraw from the study, the participant should notify Jason Dunn through email at jason.dunn@tcu.edu or via phone at (817) 395-2290 or Dr. Jo Beth Jimerson through email at j.jimerson@tcu.edu or via phone at (817) 257-6777. In this event, data collected from these persons will be disregarded from analyses. A participant may also tell the researcher at the onset of the interview that they no longer wish to participate. These same procedures may be followed for a participant not wishing to be observed.

Will I be given a copy of the consent document to keep? Yes

Who should I contact if I have questions regarding the study?

For any questions, contact Jason Dunn through email at jason.dunn@tcu.edu or via phone at (817) 395-2290 or Dr. Jo Beth Jimerson through email at j.jimerson@tcu.edu or via phone at (817) 257-6777.

Who should I contact if I have concerns regarding my rights as a study participant?
Dr. Sally Fortenberry, Chair, TCU Institutional Review Board, Phone 817 257-6752.
Dr. Bonnie Melhart, TCU Research Integrity Office, Telephone 817-257-7104.

Your signature below indicates that you have read or been read the information provided above, you have received answers to all of your questions and have been told who to call if you have any more questions, you have freely decided to participate in this research, and you understand that you are not giving up any of your legal rights.

Participant Name (please print): _____

Participant Signature: _____ **Date:**_____

Investigator Name (please print):_____ **Date:**_____

Investigator Signature: _____ **Date:**_____

Appendix B - Consent Document, Parent's Permission

Texas Christian University

Fort Worth, Texas

PARENT'S PERMISSION TO PARTICIPATE IN RESEARCH

Title of Research: Tablet Initiative: Goals, Experiences, and Outcomes

Funding Agency/Sponsor: College of Education

Study Investigators:
Principal Investigator: Jo Beth Jimerson, Ph.D.
Student Investigator: Jason Dunn, Doctoral Candidate, Educational Leadership

What is the purpose of the research? The objective of this study is to explore the start of a tablet program as it happened in one school district and to look at the amount of technology use matched stated goals.

How many children will take part in this study? In total, up to 30 children may take part in the study, no more than ten from each of three campuses.

What is my child's involvement for taking part in this study?
Your child will participate in a focus group containing no more than ten students. The group will be asked a series of questions about how they use tablets in the classroom. The session will be audio recorded for transcription. Sessions will not exceed forty five minutes All students will receive a pseudonym to protect their privacy.

For how long is my child expected to be in this study, and how much of my child's time is required? The focus group will not exceed forty five minutes during a single school day.

What are the risks of taking part in this study and how will they be minimized?
Risks for your child involve time away from class and possibly feeling uncomfortable with being audio recorded. To minimize these risks principals will be selecting the students for the focus group and any selected student may withdraw from the group at any time for any reason.

What are the benefits for taking part in the study?
Due to the size and scope of the research the findings will not be generalizable. However the educational community can still benefit from the results of this study by getting a clearer understanding of the experiences of individuals involved in a tablet program. The details provided by teachers and administrators who have participated in a tablet program will give individuals considering a similar implementation elements to consider. Administrators could benefit from insights into pitfalls that plagued leaders who have initiated the use of tablets in their own schools while teachers may benefit from information regarding student use of tablets in the classroom. The more information available to potential future implementers, the better they can understand the landscape and make informed decisions based on their own context.

Will I be compensated for taking part in the study? No, there is no financial compensation for taking part in the study.

What is an alternate procedure(s) that I can choose instead of having my child take part in this study? There is no alternate procedure to participate.

How will my child's confidentiality be protected? Your child's first and last name will never be used in any publications or records associated with this study. The name of the study campus will not be used in publications or presentations. The district, campus, and students involved in the study will all receive pseudonyms.

Is my child's participation voluntary? Yes.

Can my child stop taking part in this research? Yes. You or your child may withdraw from the study at any time.

What are the procedures for withdrawal?
Participants may withdraw their involvement at any time during the course of the study. They are free to skip any questions or stop their participation at any point during the focus group should they feel the need. If a participant would like to withdraw from the focus group, the participant should tell the researcher or notify Jason Dunn through email at jason.dunn@tcu.edu or via phone at (817) 395-2290 or Dr. Jo Beth Jimerson through email at j.jimerson@tcu.edu or via phone at (817) 257-6777. In this event, data collected from these persons will be disregarded from analyses. The consent form will be retained with the notice of withdrawal and any physical data will be shredded.

Will I be given a copy of the permission document to keep? Yes. You may keep one set of this paperwork; please return the other either providing consent or declining to participate.

Who should I contact if I have questions regarding the study?

For any questions, contact Jason Dunn through email at jason.dunn@tcu.edu or via phone at (817) 395-2290 or Dr. Jo Beth Jimerson through email at j.jimerson@tcu.edu or via phone at (817) 257-6777.

Who should I contact if I have concerns regarding my child's rights as a study participant?
Dr. Sally Fortenberry, Chair, TCU Institutional Review Board, Phone 817 257-6752.
Dr. Bonnie Melhart, TCU Research Integrity Office, Telephone 817-257-7104.

Your signature below indicates that you have read or been read the information provided above, you have received answers to all of your questions and have been told who to call if you have any more questions, you have freely allowed your child to participate in this research, and you understand that you are not giving up any of your legal rights.

Child's Name (please print): _____ Date of birth:_____

Parent's Name (please print): _____

Parent's Signature: _____ Date:_____

Investigator's Signature: _____ Date:_____

Appendix C - Consent Document, Student Assent

Texas Christian University

Fort Worth, Texas

STUDENT ASSENT TO PARTICIPATE IN RESEARCH

Title of Research: Tablet Initiative: Goals, Experiences, and Outcomes

Funding Agency/Sponsor: College of Education

Study Investigators:
Principal Investigator: Jo Beth Jimerson, Ph.D.
Student Investigator: Jason Dunn, Doctoral Candidate, Educational Leadership

What is the purpose of the research? The objective of this study is to explore the start of a tablet program as it happened in one school district and to look at the amount of technology use matched stated goals.

How many people will take part in this study? In total, approximately 300 people may take part in the study. Approximately 250 individuals will be asked to participate in a survey, 16 will be interviewed, 9 will be observed, and around 30 will take part in focus groups.

What is my involvement for taking part in this study?
You will be asked to participate in a focus group containing no more than ten students. The group will be asked a series of questions about how they use tablets in the classroom. The session will be audio recorded for transcription. All students will receive a pseudonym to protect their privacy.

How long am I expected to be in this study for and how much of my time is required? The focus group will not exceed forty five minutes during a single school day.

What are the risks of participating in this study and how will they be minimized? Risks for you involve time away from class and possibly feeling uncomfortable with being audio recorded. To minimize these risks principals will be selecting the students for the focus group and any selected student may withdraw from the group at any time for any reason.

What are the benefits for participating in this study? Due to the size and scope of the research the findings will not be generalizable. However the educational community can still benefit from the results of this study by getting a clearer understanding of the experiences of individuals involved in a tablet program. The details provided by teachers and administrators who have participated in a tablet program will give individuals considering a similar implementation elements to consider. Administrators could benefit from insights into pitfalls that plagued leaders who have initiated the use of tablets in their own schools while teachers may benefit from information regarding student use of tablets in the classroom. The more information available to potential future implementers, the better they can understand the landscape and make informed decisions based on their own context.

Will I be compensated for participating in this study? No.

What is an alternate procedure(s) that I can choose instead of participating in this study? There are no alternate procedures for participation.

How will my confidentiality be protected? Your first and last name will never be used in any publications or records associated with this study. The name of the study campus will not be used in publications or presentations. The district, campus, and students involved in the study will all receive fake names.

Is my participation voluntary? You do not have to participate.

Can I stop taking part in this research? Yes. You can stop at any time without any consequences.

What are the procedures for withdrawal? You may tell one of the researchers or your teacher if you do not want to do this anymore.

Will I be given a copy of the consent document to keep? Yes.

Who should I contact if I have questions regarding the study? For any questions, contact Jason Dunn through email at jason.dunn@tcu.edu or via phone at (817) 395-2290 or Dr. Jo Beth Jimerson through email at j.jimerson@tcu.edu or via phone at (817) 257-6777.

Who should I contact if I have concerns regarding my rights as a study participant?
Dr. Sally Fortenberry, Chair, TCU Institutional Review Board, Phone 817 257-6752.
Dr. Bonnie Melhart, TCU Research Integrity Office, Telephone 817-257-7104.

Your signature below indicates that you have read or been read the information provided above, you have received answers to all of your questions and have been told who to call if you have

any more questions, you have freely decided to participate in this research, and you understand that you are not giving up any of your legal rights.

Participant Name (please print): _____

Participant Signature: _____ Date:_____

Investigator Name (please print): _____

Investigator Signature:_____

Date: _____

Appendix D - Recruitment Letter/Email District Employees

Dear Participant,

My name is Jason Dunn and I am currently finishing my doctorate in Educational Leadership at TCU. I have taught in both elementary and middle schools so I know how challenges and excitement that comes with the teaching environment. I am passionate about making education better and in order to do that, I want to understand how technology intersects with the education of students in the classroom. I hope to learn about your experiences with students and tablets in the classroom setting. You are being contacted today because I hope you can help me with a research project I'm conducting regarding the tablet implementation your district recently enacted.

Participation is strictly voluntary and in no way will you be penalized should you choose to abstain. The study involves a survey, one-on-one interviews, and classroom observations. Throughout the course of the study there may be an opportunity for you to participate in one, two, or all three components.

The survey will be sent out to your district email address and contains a link to follow. It should take no longer than ten minutes. It will also contain a consent document with information about the study; this document is for your records and does not need to be returned.

I would also appreciate the opportunity to speak to a few teachers at X, Y, and Z campuses about their experiences. I will be working with campus leaders to identify potential participants and will be contacting some of you about that opportunity. If you are participating in an interview, it will be either face-to-face, through a video chat, or over the phone depending on your availability. If your class is observed, it will be for one class period or lesson.

The information gathered through this study will help other leaders and educators considering a tablet implementation by giving them details of your experiences. More information about tablet implementations and their results can help give a deeper context and paint a picture of the classroom technology use landscape.

I hope you will consider participation as I believe this to be a valuable topic worth pursuing. If you have any questions, please email me at jason.dunn@tcu.edu or call (817) 395-2290.

Thank you,
Jason Dunn
Doctoral Student, Texas Christian University

Participation in this study is completely voluntary. The choice to participate is yours and no district official will require your involvement. You may withdraw from any part of the study at any time by informing the researcher. No incentive or compensation is being offered for your participation. Any responses you give will be completely confidential and neither your name nor the name of your school will be disclosed by the researcher.

Appendix E - Recruitment Letter, Student Participant/Parent

Dear Participant and Parent,

My name is Jason Dunn and I am currently finishing my doctorate in Educational Leadership at TCU. I have taught in both elementary and middle schools so I know how challenges and excitement that comes with the teaching environment. I am passionate about making education better and in order to do that, I want to understand how technology intersects with the education of students in the classroom. I hope to learn about your experiences with students and tablets in the classroom setting. You are being contacted today because I hope you can help me with a research project I'm conducting regarding the tablet implementation your district recently enacted.

Participation is strictly voluntary and in no way will you be penalized should you choose to abstain. The study involves a survey, one-on-one interviews, and classroom observations. Throughout the course of the study there may be an opportunity for you to participate in a focus group.

The focus group will be will take place on your campus and should take no longer than forty five minutes. Included with this form is a consent document with information about the study; this document is for your records and does not need to be returned.

The information gathered through this study will help other leaders and educators considering a tablet implementation by giving them details of your experiences. More information about tablet implementations and their results can help give a deeper context and paint a picture of the classroom technology use landscape.

I hope you will consider participation as I believe this to be a valuable topic worth pursuing. If you have any questions, please email me at jason.dunn@tcu.edu or call (817) 395-2290.

Thank you,
Jason Dunn
Doctoral Student, Texas Christian University

Participation in this study is completely voluntary. The choice to participate is yours and no district official will require your involvement. You may withdraw from any part of the study at any time by informing the researcher. No incentive or compensation is being offered for your participation. Any responses you give will be completely confidential and neither your name nor the name of your school will be disclosed by the researcher.

Appendix F - Survey

Survey Questionnaire - Tablet Implementation

Administrator

1. Are you a teacher, administrator, or another role (please specify)?
2. What were your goals (or the district's goals) for implementing tablets in the classroom?
3. Why did you implement tablets?
4. What specific changes did you expect to see?
5. How did you communicate your expectations to your staff?
6. To what extent do you believe your goals have been reached? How do you know—are you all collecting particular data associated with the initiative?

Teacher

1. Are you a teacher or an administrator?
2. Why did you implement tablets?
3. What did your school leaders tell you about the goals of the tablet initiative, or about what teachers were expected to do differently as a result of the initiative?
4. To what extent do you believe those goals or targets have been reached? How do you know —are you all collecting data associated with the initiative?
5. What factors facilitated reaching those accomplishments? (or making those changes)
6. What factors hindered reaching those accomplishments? (or making those changes)
7. Do you think tablet use can change what happens in your classroom? How so?

Demographics and Personal Data:

How long have you been a teacher?
This if my first year
1-5 years
6-10 years
11-15 years
16-20 years
21-25 years
26 or more years

How long have you been at your current campus?
This is my first year
1-5 years
6-10 years
11-15 years
16-20 years
21-25 years
26 or more years

Ethnicity:
White
Hispanic or Latino
Black or African American
Native American or American Indian
Asian / Pacific Islander
Other

Gender:
Male
Female

Age:
18-29 years old
30-49 years old
50-64 years old
65 years and over

Appendix G - Interview Protocol

Interview Questions - Tablet Implementation

1. Tell me about your classroom before you had tablets.
2. According to your administrator, what where the expectations for using tablets in your classroom? What about instructional expectations (if they don't mention instruction)
3. Why did your school implement tablets—what were teachers told about the rationale for the program?
4. What where the goals your administrator articulated when tablets were put in your classroom? What about you—did you have different or additional goals? What were those?
5. To what extent do you believe these goals have been achieved?
6. What factors if any helped you to reach those goals?
7. What factors if any restricted you from reaching those goals?
8. Can you give me an example of a task that has changed due to tablet use?
9. How do you see your classroom changing because of tablets?

Appendix H - Focus Group Protocol

Focus Group Questions

1. On a typical day, how often do you use tablets?
2. How do you use them? Can you give me an example?
3. Which subjects do you usually use tablets for?
4. Does your teacher use a tablet? If yes, how do they use it? Can you give me an example?
5. What are some advantages to using a tablet?
6. Does anything in your classroom make it difficult to use tablets?
7. Do you know why you use tablets in class?
8. What is the best part about using tablets? The worst?

Appendix I - Observation Field Note Template

Observation Notes - Tablet Implementation

Researcher:
Place:
Purpose:
Date/Time:

Students using devices: 10 min
20 min
30 min
40 min
50 min

Participants:

Activities:

Conversations:

Subtleties:

Observer Comments:

References

Adiguzel, T., Capraro, R. M., & Willson, V. L. (2011). An examination of teacher acceptance of handheld computers. *International Journal of Special Education, 26*(3), 12-27.

Allday, R. A. (2011). Responsive management: Practical strategies for avoiding overreaction to minor misbehavior. *Intervention In School and Clinic, 46*(5), 292-298.

Anderson, R. E., & Dexter, S. (2005). School technology leadership: An empirical investigation of prevalence and effect. *Educational Administration Quarterly, 41*(1), 49-82.

Avancha, S., Baxi, A., & Kotz, D. (2012). Privacy in mobile technology for personal healthcare. *ACM Computing Surveys, 45*(1), 3:1-3:54.

Bartz, D. E. & Miller, L. K. (1991). 12 teaching methods to enhance student learning. *What Research Says to the Teacher,* 1-33.

Bebell, D., & Kay, R. (2010). One to one computing: A summary of the quantitative results from the berkshire wireless learning initiative. *Journal of Technology, Learning, and Assessment, 9*(2), 5-59.

Bebell, D., & O'Dwyer, L. M. (2010). Educational outcomes and research from 1:1 computing settings. *Journal of Technology, Learning, and Assessment, 9*(1), 5-15.

Bergmann, J., & Sams, A. (2014, May). Flipped learning gateway to student engagement. *Leading & Learning with Technology, 41*(7), 18-23.

Berrett, B., Murphy, J., & Sullivan, J. (2012). Administrator insights and reflections: Technology integration in schools. *Qualitative Report, 17*(1), 200-221.

Brand, J. & Kinash, S. (2010). Pad-agogy: A quasi-experimental and ethnographic pilot test of the iPad in a blended mobile learning environment. In C.H. Steel, M.J. Keppell, P. Gerbic

& S. Housego (Eds.), *Curriculum, technology & transformation for an unknown future. Proceedings ascilite Sydney 2010* (pp.147-151). http://ascilite.org.au/conferences/sydney10/procs/Brand- concise.pdf.

Britten, J. S., & Clausen, J. M. (2009). Cool tools, tough times: Maintaining a focus on technology infusion. Educational Leadership and Administration: Teaching and Program Development, *21*, 2139-45.

Byrom, E., Bingham, M. SERVE: Southeastern regional vision for education, g. c., & southeast and islands regional technology in education consortium, D. C. (2001). F*actors influencing the effective use of technology for teaching and earning: Lessons earned from the SEIR-TEC intensive site schools*. 2nd Edition, 1-27.

Clark, W., & Luckin, R. (2013). What the research says iPads in the classroom. London Knowledge Lab, 1-33. Retrieved from https://www.lkldev.ioe.ac.uk/lklinnovation/wp-content/uploads/2013/01/2013-iPads-in-the-Classroom-v2.pdf.

Collins, K. B., & Doll, C. A. (2012). Resource provisions of a high school library collection. *School Library Research, 15*, 15-32.

Collins, A. & Halverson, R. (2009). *Rethinking education in the age of technology the digital revolution and schooling in america*. New York, NY: Teachers College Press.

Colwell, J., Hunt-Barron, S., & Reinking, D. (2013). Obstacles to developing digital literacy on the internet in middle school science instruction. *Journal of Literacy Research*, *45*(3), 295-324.

Conklin, K. R. (1973). Wholes and parts in teaching. *Elementary School Journal, 74*(3), 165-171.

Considine, D. (2009). Teaching and reading the millennial generation through media literacy. *Journal of Adolescent & Adult Literacy, 52*(6), 471-481.

Crichton, S., Pegler, K., & White, D. (2012). Personal devices in public settings: Lessons learned from an iPod touch/iPad project. *Electronic Journal of E-Learning, 10*(1), 23-31.

Demski, J. (2012). The principal as tech leader. *T.H.E. Journal, 39*(5), 48-50.

Dennick, R. (2012). Twelve tips for incorporating educational theory into teaching practices. *Medical Teacher*, *34*(8), 618-624.

Dexter, S. L., Anderson, R. E., & Becker, H. (1999). Teachers' views of computers as catalysts for changes in their teaching practice. *Journal of Research on Computing in Education, 31*(3), 221-239.

Dickerson, J., Williams, S., & Browning, J. B. (2009). Scaffolding equals success in teaching tablet PCs. *Technology Teacher, 68*(5), 16-20.

Doyle, L. H. (2004). Leadership for community building: Changing how we think and act. *Clearing House, 77*(5), 196-199.

Echeverri, J., & Sadler, T. D. (2011). Gaming as a platform for the development of innovative problem-based learning opportunities. *Science Educator, 20*(1), 44-48.

Elmore, B. (2013). New digital dawn: How technology is changing business. *Baylor Business Review, 32*(1), 4-9.

Englehart, J. M. (2013). Five approaches to avoid when managing the middle school classroom. *Clearing House: A Journal of Educational Strategies, Issues and Ideas, 86*(3), 103-108.

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education, 42*(3), 255-284.

Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education, 59*(2), 423-435.

Fernandez-Lopez, A., Rodriguez-Fortiz, M., Rodriguez-Almendros, M., & Martinez-Segura, M. (2013). Mobile learning technology based on iOS devices to support students with special education needs. *Computers & Education, 61*, 77-90.

Forlano, L. (2009). WiFi geographies: When code meets place. *Information Society, 25*(5), 344-352.

Fuegen, S. (2012). The impact of mobile technologies on distance education. *Techtrends: Linking Research and Practice to Improve Learning, 56*(6), 49-53.

Gall, M., & Gillett, M. (1980). The discussion method in classroom teaching. *Theory Into Practice, 19*(2), 98-103.

Galligan, L., Loch, B., McDonald, C., & Taylor, J. A. (2010). The use of tablet and related technologies in mathematics teaching. *Australian Senior Mathematics Journal, 24*(1), 38-51.

Giles, M. (2011, October 11). Beyond the PC. *Economist*. Retrieved from http://www.economist.com/node/21531109.

Gillard, S., Bailey, D., & Nolan, E. (2008). Ten reasons for IT educators to be early adopters of IT innovations. *Journal of Information Technology Education, 7*, 21-33.

Gray, L., Thomas, N., & Lewis, L. (2010). Teachers' use of educational technology in US public schools: 2009 (NCES 2010-040). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Guskey, T. R. (2007). Closing achievement gaps: Revisiting Benjamin S. Bloom's "Learning for mastery". *Journal Of Advanced Academics, 19*(1), 8-31.

Haan, J. D. (2012, August 15). How to roll out a 1:1 iPad program. Retrieved from http://www.edutopia.org/blog/one-to-one-program-rollout-jac-de-haan.

Hayes, D. (2006). Making all the flashy stuff work: The role of the principal in ICT integration. *Cambridge Journal of Education, 36*(4), 565-578.

Henson, K. T., & Borthwick, P. (1984). Matching styles: A historical look. Theory Into Practice, 23(1), 3-9.

Hohlfeld T, Ritzhaupt A, Barron A, & Kemker K. (2008). Examining the digital divide in K-12 public schools: Four-year trends for supporting ICT literacy in Florida. *Computers & Education,* 51(4), 1648-1663.

Hutchison, A., Beschorner, B., & Schmidt-Crawford, D. (2012). Exploring the use of the iPad for literacy learning. *Reading Teacher, 66*(1), 15-23.

James, L., Pate, J., Leech, D., Martin, E., Brockmeier, L., & Dees, E. (2011). Resource allocation patterns and student achievement. *International Journal of Educational Leadership Preparation, 6*(4), 1-10.

Janicki, K. (2011). Communication and understanding. *AILA Review, 24*(1), 68-77.

Johnson, B. (1965). Review of recent research on methods of teaching, 1-27.

Johnson, D. (2012). Stretching your technology dollar. *Educational Leadership, 69*(4), 30-33.

Johnson, L. S. (2008). Relationship of instructional methods to student engagement in two Public high schools. *American Secondary Education, 36*(2), 69-87.

Kingsley, T. & Tancock, S. (2014). Internet inquiry: Fundamental competencies for online comprehension. *Reading Teacher*, 67(5), 389-399.

Konrad, M., Helf, S., & Joseph, L. M. (2011). Evidence-based instruction is not enough: Strategies for increasing instructional efficiency. *Intervention in School and Clinic, 47*(2), 67-74.

Koehler, M. J., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge (TPACK)?. *Journal of Education, 193*(3), 13-19.

Kopcha, T. J. (2012). Teachers' perceptions of the barriers to technology integration and practices with technology under situated professional development. *Computers & Education, 59*(4), 1109-1121.

Laferrière, T. T., Hamel, C. C., & Searson, M. M. (2013). Barriers to successful implementation of technology integration in educational settings: A case study. *Journal of Computer Assisted Learning, 29*(5), 463-473.

Laurillard, D. (2007). Modelling benefits-oriented costs for technology enhanced learning. *Higher Education: The International Journal of Higher Education and Educational Planning, 54*(1), 21-39.

Levin, B. B., & Schrum, L. (2013). Using systems thinking to leverage technology for school improvement: Lessons learned from award-winning secondary schools/districts. *Journal of Research on Technology in Education (International Society For Technology In Education), 46*(1), 29-51.

Lim, C. P., Zhao, Y., Tondeur, J., Chai, C. S., & Tsai, C. C. (2013). Bridging the gap: Technology trends and use of technology in schools. *Educational Technology & Society, 16*(2), 59-68.

Liu, C. M., & Chen, L. S. (2009). Applications of RFID technology for improving production efficiency in an integrated-circuit packaging house. *International Journal of Production Research, 47*(8), 2203-2216.

Marks, H. M., & Printy, S. M. (2003). Principal leadership and school performance: An integration of transformational and instructional leadership. *Educational Administration Quarterly, 39*(3), 370-97.

Marzano, R. J. (2007). The art and science of teaching. Alexandria, VA: ASCD.

McAlister, A. (2013). For the love of the game. *American Music Teacher, 62*(5), 28-31.

McFarlane, D. A. (2011). Multiple intelligences: The most effective platform for global 21st century educational and instructional methodologies. *College Quarterly, 14*(2), 1-8.

McLeod, S., & Richardson, J. W. (2013). Supporting effective technology integration and implementation. In M. Militello and J. I. Friend (Eds.), principal 2.0: Technology and educational leadership. Charlotte, NC: Information Age Publishing.

Means, B. (1994). Technology and education reform the reality behind the promise. San Francisco, California: Jossey-Bass Inc.

Merchant, G. (2012). Mobile practices in everyday life: Popular digital technologies and schooling revisited. *British Journal of Educational Technology, 43*(5), 770-782.

Merriam, S. B. (2009). Qualitative research a guide to design and implementation. San Francisco, CA: Jossey-Bass.

Meyer, J. A. (1969). Teaming a first step for interdisciplinary teaching, *Clearing House, 43*(7), 406-410.

Mifsud, C. L., Vella, R., & Camilleri, L. (2013). Attitudes towards and effects of the use of video games in classroom learning with specific reference to literacy attainment. *Research in Education, 90*, 32-52.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017-1054.

Modarres, A. (2011). Beyond the digital divide. *National Civic Review, 100*(3), 4-7.

Mouza, C. (2008). Learning with laptops: Implementation and outcomes in an urban, under-privileged school. *Journal of Research on Technology in Education, 40*(4), 447-472.

Muehrer, R., Jenson, J., Friedberg, J., & Husain, N. (2012). Challenges and opportunities: using a science-based video game in secondary school settings. *Cultural Studies of Science Education, 7*(4), 783-805.

Murray, O. T., & Olcese, N. R. (2011). Teaching and learning with iPads, ready or not?. *Techtrends: Linking Research and Practice to Improve Learning, 55*(6), 42-48.

Pachtman, A. B. (2012). Developing critical thinking for the internet. *Research & Teaching in Developmental Education*, 29(1), 39-47.

Pegrum, M., Oakley, G., & Faulkner, R. (2013). Schools going mobile: A study of the adoption of mobile handheld technologies in western Australian independent schools. *Australasian Journal of Educational Technology, 29*(1), 66-81.

Peluso, D. C. (2012). The fast-paced iPad revolution: Can educators stay up to date and relevant about these ubiquitous devices?. *British Journal of Educational Technology, 43*(4), E125-E127.

Peters, D. L. (1970). Discovery learning in kindergarten mathematics. *Journal for Research in Mathematics Education, 1*(2), 76-87.

Powell, K. C., & Kalina, C. J. (2009). Cognitive and social constructivism: Developing tools for an effective classroom. *Education*, *130*(2), 241-250.

Risinger, C. (2007). Crossing borders and building bridges using the internet. *Social Education, 71*(7), 380-382.

Ritzhaupt, A. D., Feng, L., Dawson, K., & Barron, A. E. (2013). Differences in student information and communication technology literacy based on socio-economic status, ethnicity, and gender: Evidence of a digital divide in Florida schools. *Journal of Research on Technology in Education (International Society For Technology In Education), 45*(4), 291-307.

Rivero, V. (2009). Tightening the purchasing process. *District Administration, 45*(10/11), 78-84.

Roberts, D. F., & Foehr, U. G. (2008). Trends in media use. *Future of Children, 18*(1), 11-37.

Robertson, B. (2007). Getting past "inquiry versus content". *Educational Leadership, 64*(4), 67-70.

Rossing, J. P., Miller, W. M., Cecil, A. K., & Stamper, S. E. (2012). iLearning: The future of higher education? Student perceptions on learning with mobile tablets. *Journal of the Scholarship of Teaching and Learning, 12*(2), 1-26.

Salpeter, J. (2009). Textbook deathwatch. *Tech & learning, 30*(1), 26.

Seaman, M. (2011). Bloom's taxonomy. *Curriculum & Teaching Dialogue, 13*(1/2), 29-43.

Shoop, J. (2009). Terror in the board room: The bid-opening process. *School Business Affairs, 75*(2), 28-30.

Simmons, K. D., & Carpenter, L. B. (2010). Spelling and assistive technology: Helping students with disabilities be successful writers. *Physical Disabilities: Education and Related Services, 29*(2), 5-19.

Shin, N., Sutherland, L. M., Norris, C. A., & Soloway, E. (2012). Effects of game technology on elementary student learning in mathematics. *British Journal of Educational Technology, 43*(4), 540-560.

Skylar, A. (2009). A comparison of asynchronous online text-based lectures and synchronous interactive web conferencing lectures. *Issues in Teacher Education, 18*(2), 69-84.

Stallings, J., & Krasavage, E. M. (1986). Program implementation and student achievement in a four-year Madeline Hunter follow-through project. *Elementary School Journal, 87*(2), 117-38.

Stewart, S. H. (1997). Setting the stage for success: Assessing the instructional environment. *Preventing School Failure, 41*(2), 53-56.

Storz, M. G., & Hoffman, A. R. (2013). Examining response to a one-to-one computer initiative: Student and teacher voices. *RMLE Online: Research in Middle Level Education, 36*(6), 1-18.

Swan, K., van't Hooft, M., Kratcoski, A., & Unger, D. (2005). Uses and effects of mobile computing devices in K-8 classrooms. *Journal of Research on Technology in Education, 38*(1), 99-112.

Taylor, A. (2012). A study of the information search behavior of the millennial generation. *Information Research: An International Electronic Journal*, *17*(1), 1-17.

Taylor, J. M., & Rowe, B. J. (2012). The "Mozart effect" and the mathematical connection. *Journal of College Reading and Learning, 42*(2), 51-66.

Taylor, S. J. & Bogdan, R. (1998). Introduction to qualitative research methods a guidebook and resource third edition. New York, NY: John Wiley & Sons, Inc.

Teo, T. (2012). Examining the intention to use technology among pre-service teachers: An integration of the technology acceptance model and theory of planned behavior. *Interactive Learning Environments, 20*(1), 3-18.

Tomlinson, C. (2000). Reconcilable differences: Standards-based teaching and differentiation. *Educational Leadership, 58*(1), 6-11.

Traxler, J. (2010). Students and mobile devices. *ALT-J: Research in Learning Technology, 18*(2), 149-160.

Valadez, J. R., & Duran, R. (2007). Redefining the digital divide: Beyond access to computers and the internet. *High School Journal, 90*(3), 31-44.

VanVooren, C., DeVore, D., & Ambriz-Galaviz, N. (2011). Managing positive stress for change in the implementation of technology in schools. *Journal of Systemics, Cybernetics & Informatics, 9*(2), 28-31.

Vega, V. (2013, February 5). Technology Integration Research Review. Retrieved from http://www.edutopia.org/technology-integration-research-learning-outcomes#key.

Wayman, J. C., & Cho, V. (2012). Districts' efforts for data use and computer data systems: The role of sensemaking in system use and implementation, 1-70. Retrieved from http://

edadmin.edb.utexas.edu/datause/papers/Cho%20%20Wayman%20AERA%202012%20v2.pdf.

Webster, F., & Lusch, R. (2013). Elevating marketing: marketing is dead! Long live marketing!. *Journal of the Academy of Marketing Science*, 41(4), 389-399.

Whiting, B., & Render, G. F. (1987). Cognitive and affective outcomes of mastery learning: A review of sixteen semesters. *Clearing House, 60*(6), 276-80.

Witherspoon, L., & Manning, J. P. (2012). Active gaming: The future of play?. *American Journal of Play, 4*(4), 464-487.

Yin, R. K. (2009). Case study research design and methods fourth edition. Thousand Oaks, CA: Sage Publications, Inc.

Yousuf, M. (2007). Effectiveness of mobile learning in distance education. *Online Submission, 8*(4), 114-124.

Zemelman, S., Daniels, H., & Hyde, A. A. (2005). Best practice: Today's standards for teaching and learning in America's schools. Heinemann Educational Books.